Identification of Non-Value-Added Tasks in Shipbuilding

U. S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION, NAVAL SURFACE WARFARE CENTER

in cooperation with

Newport News Shipbuilding

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NATIONAL SHIPBUILDING RESEARCH PROGRAM

PANEL SP-8

INDUSTRIAL ENGINEERING

FINAL REPORT: Task N8-91-1

IDENTIFICATION OF NON-VALUE-ADDED TASKS IN SHIPBUILDING

February 1993

Sponsored by the Society of Naval Architects and Marine Engineers

Project Funded by the U.S. Navy

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ACKNOWLEDGEMENTS

The NSRP (National Shipbuilding Research Program) is dedicated to improving the productivity and competitive stature of the U.S. shipbuilding and repair industry through the development and implementation of advanced technology. This project resulted from the cooperative efforts of shipbuilders associated with the NSRP'S SP-8 Industrial Engineering Panel, and was performed by Barry M. Schram & Associates of La Jolla, California.

The follow-rig U.S. shipyard personnel were most instrumental in the project

Avondale Industries Inc.
Ed Mortimer, Mike Simpson, Steve MaGuire, Robert Oehmichen, James Morehead, and Frank Bondio

Charleston Naval
Carl Tarpley

Coast Guard Shipyard
Captain Yuhaus, Ursula Yeo, Fran Cohen

Ingalls Shipbuilding
Dave Wright Pete Price, Roland Harper, Frank Martin, and Ron Krotoszynski

Mare Island Naval Shipyard
Bill Pries, Les Sherry, and Larry Tucker

NASSCO
Spencer French, Judie Blakey, Len Schneider, and Jerry Keener

Peterson Builders, Inc
Larry Maples, James Rogness

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Odense-Linde (Odense) **Robin Fonseca**

HDW (Kiel, Germany) **Hans Saeger, Uwe Karsten Petersen**

Bremen Vulcan (Breman, Germany) **Joachim Brodda**

Meyer-Werft (Pappenberg, Germany) **Mr. E. Deustchmann**

BIBA Institute (Bremen, Germany) **Markus G. Lehne, Dr. Bernard E. Hirsch**

EXECUTIVE SUMMARY

The project's objective was to utilize industrial engineering techniques to develop a true, non-accounting-focused definition of non-value-added tasks for use throughout the U.S. Shipbuilding Industry. The project has borne out the effectiveness of that approach and has provided a dynamic tool for focusing improvement efforts at all levels in a shipyard. The ambitious scope of the project provided it with the proper framework to define and develop its conclusions and methodologies as proposed. The level of detail and exchange, however, was adjusted due to constraints of budget and the unexpected risks involved in exchanging data between currently competing parties in the same industry.

Fundamental to the approach was the adaptation of a strict, basic definition of what is a non-value-added task. The basic definition is similar to how one utilizes a labor standard, "You get one chance to do it right." The primary assumption is that there is only one best proces/material flow or method to build a particular ship. If shipyard "A" has the proper business systems, work flow, space, and maximum crane tonnage to minimize lifts and maximize outfitting, as well as ideal process layouts and equipment, Shipyard "A" sets the standard. If shipyards "B", "C", and "D" only match up to the ideal yard in a variety of ways, those non-ideal operations would be classified as having proportional non-value-added elements.

With such discipline in definition, shipyards "B", "C",and "D" can better establish where and how to proceed with strategic planning of operations and capital investment. Such an approach requires that management optimize operations within a disciplined framework for building a ship. As our friends in Europe said, "We must go from being a shipyard to becoming a ship factory." (from a marketing video entitled, "Shipyard to Ship Factory;" Odense-Linde; Odense, Denmark)

The project recommends the definition of a shipyard's activities at levels of value-added and non-value-added, with localized attributes for each level of definition. Such a comprehensive approach provides a common focus, a visual relationship of the ideal production flow to current products. Moreover, it provides visibility of what can be done and where there are limiting factors. The approach, as discussed thus far, refers to the current or target products as being ships. It is imperative to note that the survival of U.S. shipyards in the years ahead may well require the expansion and integration of core competencies in order to compete in markets other than shipbuilding.

The current financial status of the U.S. Shipbuilding Industry, relative to global commercial contracts and military contracts, does not allow for extensive research or recapitilization of current facilities. Burdened with the constraining focuses of current shipyard financial practices, the industry is in the unfavorable position of attempting to progress forward while still utilizing data which has no relationship to reality. The consensus obtained from this

NSRP study is that U.S. shipyards who have contracts with the U.S. Military are encumbered with a complex array of requirements creating a joint non-value-added existence" for both the customer and the contractor. That is about as kindly as the facts can be stated. It has been said that in building a ship for the U.S. Military, two measures of dead weight tonnage are required. The first is DWT of the ship. The second is DWT of the paperwork required by the customer. Some say the latter often approaches that of the former.

Such an existence has, without question, created a cancerous weight in shipyard organizations. Methods of operations at all functions-and levels have been bloated to the point that it might be best to just start all over. Such has been the approach of many Japanese industries when reaching various levels of success within an industry. After developing strategy for new products concurrent with new methods of production, they have closed old facilities and started anew. One primary reason is that the existence of non-value-added tasks within any organization commonly occurs through normal levels of compromise and optimization. Even facilities and processes developed and placed into service for a short time can have the cancer of non-value-added tasks.

During our visits and discussions at European shipyards, we uncovered common ground and valuable lessons for U.S. Shipbuilding. Though it was not known as such, non-value-added analysis was performed in all potential markets to determine basic recapitalization in facilities and processes that would best serve their strategy. Much of each decision has been based upon an intense commitment to change. Risks have been taken and, though still not having a totally ideal shipyard process flow, markets have been secured by vastly improving the capacities of processes and facilities. There was extensive utilization of industrial engineering principles as a focal point for defining and implementing change. The IE function had various titles, but was clearly a key leader and driver in the overall success at each facility. Why some U.S. shipyards have either reduced or eliminated the IE function is most distressing.

The methodologies provided in this project can be utilized as a key focusing tool to aid in long range corporate planning, organizational definitions, proper customer/contractor levels of communication, and continuous process improvement. The focus on non-value-added levels of definition in a total quality environment provides specific direction much more effectively than the non-focused efforts of past efforts, such as quality circles and corporate suggestion programs.

The project provides an effective set of methodologies to identify and optimize the elimination of the non-value-added tasks which are prevalent in the aforementioned "joint non-value-added existence." Hopefully, through this project, the NSRP will have seeded an effort which will attract extensive support and activity from the highest levels of both the U.S. Shipbuilding Industry and the U.S. Government. Nothing short of that is required.

I. INTRODUCTION

The contract for this project was awarded to Bany M. Schram and Associates in late August, 1991, which is significant because the abstract was developed in early 1990 and approved by the ECB in mid 1990. The extended time span was due to the transition of the NSRP from the Maritime Administration to the David Taylor Research Center (now known as the Naval Surface Warfare Center - Carderock Division). During early SP-8 Panel discussions on the abstract and proposal for this project, it was decided to conduct much of the on-site developmental work with the IE staff at Charleston Naval Shipyard. By the time the contract was awarded, however, Charleston was being downsized and reorganized, and graciously declined our written request for their participation. (See Appendix C)

The approach to this project centered upon direct solicitation oftop management at various shipyards to participate in the study at no charge. Letters of request were sent by Barry M. Schram & Associates and letters of introduction were sent by Mr. Dale Rome, Contracting Officer's Technical Representative at NSWC - Carderock Division. (See Appendix C) Response was targeted for representative private shipyards with new construction and public shipyards, with the intention of keeping travel to a minimum. The scope of domestic travel changed with the unavailability of Charleston to participate.

Project objectives expanded in accordance with NSRP desires to involve more shipyards in NSRP project work. We were able to solicit the participation of both Avondale and Ingalls on the project, however, that took more time than anticipated because neither shipyard had current representation on the SP-8 Panel. Two public shipyards responded positively, but two other public shipyards did not respond due to downsizing and reorganization. NASSCO was contacted in late 1991 and provided valuable assistance. The staff at PBI contacted us, but the logistics of travel and lack of commonality with potential task listings put them beyond the scope of this project.

Avondale Industries was the site selected for the initial development of our methodologies in a pilot program which was conducted through the first quarter of 1992. Starting with the agreement of top management, we proceeded gradually to develop "areas for analysis". In meetings with a select team from Avondale, we defined the pilot program, developed a schedule, and implemented it. Concurrently, BMS & Assoc. met with representatives of Ingalls Shipbuilding, the U.S.C.G. shipyard, and Mare Island Naval Shipyard to present an overview of the work that was being accomplished with the Avondale Team. We did follow-up again with the two public shipyards, but could not spend the time we would have liked to spend, due to cost and logistics.

It was also discovered that all of the shipyards were concurrently involved in different levels of contract competition. The risk of any exchange of data and information for this project

being wrongly interpreted was realistic and not worth putting BMS & Associates out of business. The IE analysis phase was slightly revamped to reduce such exchanges and all participants were guaranteed their right to review and edit the final draft of this report for any normalization of data prior to distribution. Sharing is alive and well, as long as these proper requests are honored. In all shipyards, foreign and domestic, we made every effort to review and analyze the data that was made available without compromising the position of those sharing it with us.

The project abstract and proposal included a planned analysis of foreign shipyards and it was decided that a visit to European shipyards would be more relative than a visit to Japanese shipyards. The recent progress of European shipyards can be directly related to various U.S. shipyards. Japanese shipyards are currently superior in facilities and processes in most of the commercial shipbuilding markets. Moreover, we were led to expect and did receive open, indepth, and candid information on all visits within the European shipbuilding community.

The greatest delays and problems were experienced in obtaining the initial confirmation required from the various foreign and domestic shipyards, which required considerable time and expense. It is important to note that the project was never intended to develop and implement a program at anyone facility. The goals were to increase shipyard sharing and participation within an NSRP project. The main deliverables are the methodologies which have been developed and proven.

II. APPROACH and PROJECT METHODOLOGY

A Project Objectives

Technical Objective:

To utilize industrial engineering techniques for developing a focused non-accounting definition of non-value-added tasks for use throughout the shipyard industry, together with a determination of how these tasks should be documented.

Project Objectives: (These were developed in the project and utilized for all site presentations. (Appendix P-1)

To enlist participation of various private and public shipyards

To define and develop methodologies for identifying and categorizing non-value added activities and tasks

To define and develop methodologies for eliminating non-value-added activities and tasks

To analyze the approach taken toward non-value-added tasks in foreign shipyards

To report findings and provide a "how to" approach for identifying and eliminating non-value-added tasks in shipbuilding

B. Definition of Non-Value-Added Activities and Tasks

The project approach is based on strict definition of what is a non-value-added activity or task. Such definition is analogous to the strict application of labor standards for an activity or task There is only one try to do it right and earn the standard for a given activity or task That common application results in a measure of performance being stated by the result of dividing the standard time by the actual time to perform the activity or task.

Another important aspect of defining non-value-added activities or tasks is to assume that there is only one best flow or method to build a particular ship. For example, if shipyard “A” has the proper work flow, space, and maximum crane tonnage to minimize lifts while maximizing outfitting, and has successfully integrated the flows of resources throughout its operations, Shipyard “A" becomes the logical ideal or “standard.” If shipyards “B", “C”, and “D” fall short of that standard, those non-ideal operations are classified as having proportional, non-value-added elements in their structures. Wtih such discipline in definition, shipyards “B", “C”, and “D” can better establish where and how to proceed with capital and operational strategies.

Accepting such an approach as the format of analysis and classification served as the basis for this project. What will become evident is that the basic set of ground rules can be expanded and customized to suit individual shipyards. The methodology allows for varying levels of application and analysis to suit the unique needs of the user. These were defined initially in NSRP Project #0337 Task N5-89-4.

Value Level Definitions:

The following definitions were utilized in all site presentations and analyses:

VL1 Part of the Process + Value Added to Final Product

VL2 Not Part of the Process + Value Added to Final Product

VL3 Part of the Process + No Value Added to Final Product

VL4 Not part of the Process + No Value Added to Final Product

Two additional levels of classification were adopted from Activity Based Costing:

N = Necessary

U = Unnecessary

The following industry-specific attributes were also added:

1- Out of Sequence

2- Facility/ Design Constraint

3-Quality / Industry Standard Requirement

4- Government Regulation (Environmental)

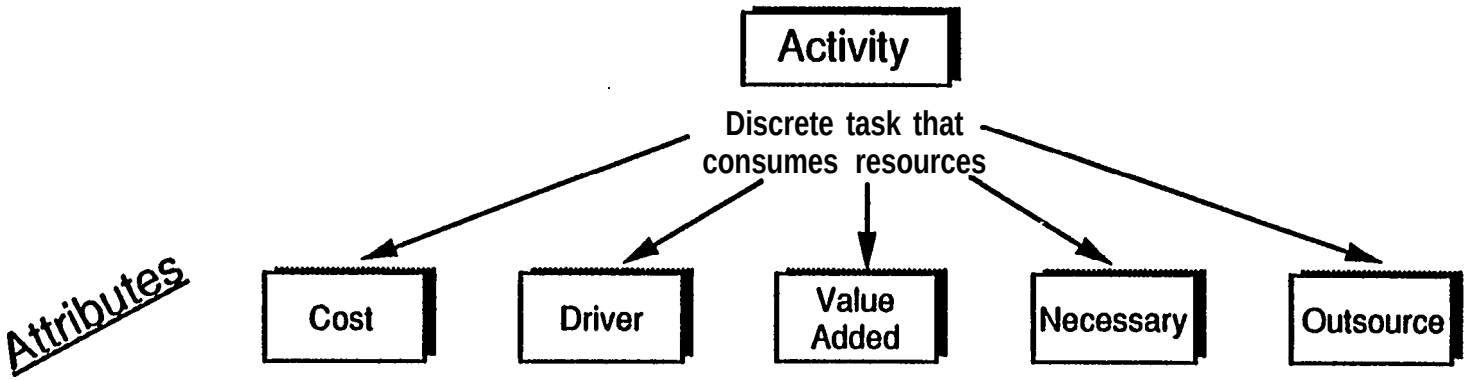
5- Government Regulation (Other Customer Requirement)

(Note: The listing above is shown in chart form in Appendix P-2)

The definition now hooks all activities and tasks to specific criteria. Once an organization can view its total or selected operations in the perspective of such specific, non-value-added components, it has a defined focus for implementing capital and operational strategies to eliminate wasted effort and resources.

The following chart from CAMI, the International Computer Aided Manufacturing Institute, was most useful in the project. (It is interesting to note that the U.S. Navy and Avondale are listed as 1990 Participants with CAMI.) The chart is from CAMI'S glossary of Activity Based Costing Definitions. The project parallels the principles of Activity Based Costing in the utilization of non-value-added studies to target areas of attainable cost savings.

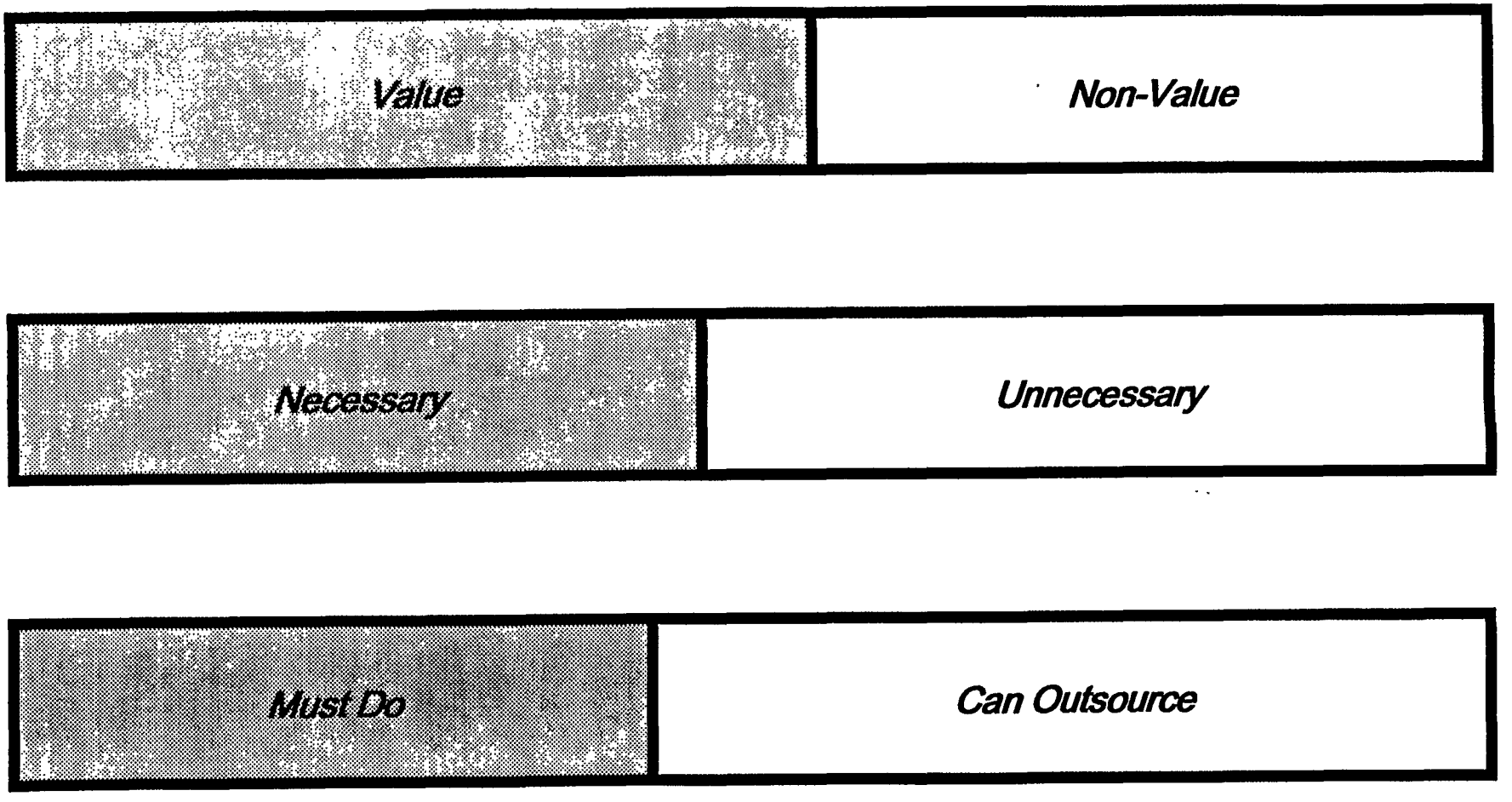
We Also Selected Activity Attributes Appropriate for Supporting a Cost Reduction Study



What	All costs including labor, expenses, PPE, computers, etc.	Quantifiable occurrence that has direct impact on total activity cost	An activity that enhances the product in the eyes of the customer	Not value-added but is req'd for the ongoing viability of the business	Candidate for procurring from outside supplier
Why	Focuses attention on total cost, not just direct labor	Provides understanding of how costs are incurred	Allows segregation of activities in order to: • Improve effectiveness • Improve efficiency • Eliminate costs		Enables cost reduction and focus on core competencies

Figure 1

ACTIVITY ATTRIBUTES



% of Activity Cost

Figure 2

c. Management Participation

From project inception through the conclusions and recommendations of this report, the target has been shipyard executive management. The success of any analysis for change, as well as its implementation, must be driven from the outset by the active and knowledgeable participation of shipyard executive management.

When it became apparent that the project could not begin with Charleston Naval Shipyard, the cooperation of other shipyards was solicited. When written and telephone communications had generated a level of support, a site meeting and presentation was arranged. BMS & Associates presented a basic project overview which is included in this report as part of Appendix P. (Note Appendix P indudes all presentations made at participating shipyards and to Panel SP-8.)

Shipyard participation was predicated on allowing BMS & Associates to conduct interviews and analyze data on-site. Each shipyard would provide a liaison or point of contact for the everyday activity and for communication with upper management. The shipyard would get no funding from the project, but would have continuous control of any output of analysis. There were site visit debriefings, some of which were written and signed. Essentially, BMS & Associates presented and discussed progress and findings with designated staff. That approach was generally accepted and became the basic mode of operation at all sites. Great care was taken to preserve the confidentiality of information. Because of competitive bidding by participating shipyards, the exchange and verification of information between shipyards was purposely curtailed.

BMS & Associates utilized a document entitled, “Shipyard Analysis Plan” (Appendix P-3) as its basic format at each site. To more clearly illustrate the level and importance of management participation, that document has been redefined as a flow chart entitled, “Identification of Non-Value-Added Tasks in Shipbuilding - Site Program Procedure Flow”.

Site Program Procedure Flow

I Shipyard Management Commitment to Site Program.

A. Endorsement of this final report.
B. Optional retaining of third party facilitator (Example: BMS & Associates).
c. Long range program plan - statement of goals and objectives
D. Shipyard team definition and empowerment. (Industrial Engineering Function.)

II. Program Organization

A. Establish analysis headquarters (Team Leader)
B. Initial briefing (Team)
c. Selection of specific areas for analysis (Team Leader/Team)
D. Data availability analysis (Team)
E. Preliminary analysis schedule development (Team)
F. Program authorizations, formats, data collection methods, facilities selection and set-up (Management, Team, Team Leader)

III. Site Program

A. Briefings to all levels of shipyard management (30-45 minutes) (Team)
B. Interviews with shipyard management from areas selected for analysis, utilizing the "Activity Analysis Questionnaire" (Appendix M)
(Note: Two interviews minimum with each party required.)
c. Ongoing Analysis - Each Area.

Briefings
Interviews (Initial and Follow-ups)
Data gathering
Analysis
Results definition analysis and verification.

IV. Task Listing and Classification.

A. Listing verification
B. Database entry and verification
c. Debriefing with local management

v . Elimination Analysis

A. Integration with other programs
B. Alignment to management goals and objectives
c. Assess success factors (Team/Facilitator)
D. Assess participants attitude to change (Team/Facilitator)
E. Define elimination classifications to be applied. (Team/Facilitator)
F. Assign costs and savings associated with each action. Include a separate category for cost of implementation. Show net savings, time for planning, analysis, and implementation. (Team)
G. Summarize the above for presentations to all levels for implementation. (Team)

VI. implementation of cost saving measures

A. Ongoing teams and procedures.
B. Success reporting from identification to implementation. (Team/Facilitator)
c. Ongoing management strategic planning, decisions, and direction.

Figure 3

D. Specific Study Area Selection

As stated in the Executive Summary, the scope of the project was found to be too ambitious for the status of the industry. That was also the consensus of the shipyards that we invited to participate. Potential study areas for the identification and elimination of non-value-added costs are listed as follows:

Note Not all study areas were covered in this initial project. Each item stands as a project of its own.

POTENTIAL STUDY AREAS

I. Outfitting

- A. Onboard
- B. Modular
- c. Overall Outfitting Planning

II. Production Support Services

- A. Docking/Undocking - Etc.
- B. Assembly Support
  1. Onboard
  2. Modular - (keel to units)
  3. Flow Line - (Process Line/Lanes)
  4. Shops
  5. Planning and Scheduling.
- c. Maintenance

III. Regulatory Cost Reporting Requirements

- A. Local Regulations
- B. Environmental
- c. Customer Reporting
- D. Industry and Quality Standards

IV. Engineering /Support Areas

- A. Work Breakdown Structure Activities
- B. Change Orders
- c. Master Scheduling

Figure 4

Shipyard management of participating shipyards selected areas from the list where they wanted us to begin. Teams were selected representing shipyard operations and project staff. A permanently assigned project liaison always accompanied BMS & Associates. Each shipyard wanted that level of liaison to support the project and to ensure continuity for future change.

Each team selected a specific area from the listing and conducted an industrial engineering review to identify smaller, more visible components for analysis. Normal group brainstorming selection techniques were utilized to list and categorize the sub-areas. Various objective and subjective afteria were utilized to develop a detailed, working listing. In most cases, the listing per area included 15-28 sub-areas.

The next objective of the team was to analyze the levels of functional and cross-functional relationships in each of the areas, using the common industrial engineering technique of listing and categorizing functions and their relationships within the various interfacing organizations. Once the tasks are categorized, a strategy for elimination must be clearly defined. Such analysis is critical to the overall success of change implementation, as is a strategy to assure strong, cross-functional participation. Such a level of control is not often available in TQM Programs or suggestion plans.

The credibility of management participation in any such program becomes most crucial, because objective analysis does not allow for the constraints of "sacred cows". When non-value-added task/activity analysis is committed to, management must be ready to act objectively on all findings of the analysis. In many organizations, that will create some challenging situations and opportunities. Allowing the freedom for thorough cross-functional analysis and implementation is the direct responsibility of top management. Their dedicated participation is the foundation and truest measure of success in such a program.

E. Summary - Approach/Project Methodology

The crux of the approach was to set obtainable objectives for the project. Those objectives were defined and met through developing a set of workable methodologies for identification and elimination of non-value-added tasks in shipbuilding. There were no set goals of dollar savings or procedural changes in shipbuilding. Industrial engineering analysis techniques were applied to the study throughout all phases.

The extended effort to continuously involve shipyard top management with the project was a “standard-setter” for NSRP projects. It was an extended effort because we successfully involved the top management of seven shipyards in the project. The experience of that effort was invaluable in determining how such a project should be approached in the future.

The project methodology of BMS & Associates, being an objective third party to the shipyards participating on the project, diluted the potential for the subjectivity which seems to be inherent in contract awards to a single shipyard. The latter type of contract scenario tends toward the undesirable management constraints and limitations of parochialism. The methodology of a third party working with top management and applying industrial engineering techniques was proven to be cost and results effective, and is strongly recommended. It is a format for objectivity, the opening of new perspectives, and the orderly elimination of wasted effort and resources.

III. SITE ACTIVITY and METHODOLOGY DEVELOPMENT

Overview:

This section will briefly document the chronological events of the project and the development of methodologies. The combination of pre-planning, strategy execution, and industrial engineering analysis will be seen as key factors in the success of the project.

A. Shipyard Participation

Shipyard participation was a key factor in the project. There are many public and private shipyards that do not participate fully with NSRP projects; either in sharing, bidding or panel participation. Another key factor was the diminishing level of industrial engineering in private shipyards. The proper utilization of industrial engineering techniques in any industry will always yield positive results, while being cost-effective and assuring continuous process improvement. (Please note that industrial engineering techniques are also employed by functions utilizing a different title.)

We were successful in obtaining participation from a prominent shipyard that used to be active in the NSRP, but was not currently active. At a meeting with a top management team, it was agreed that a "pilot study" would be pre-planned with the selection of the study areas to be determined at a pre-planning session. It cannot be overemphasized that the level of commitment from the top was most helpful to our efforts.

We followed up with various logistics of site access, proper badge, debriefing requirements, a schedule plan for the next visit, a work area for BMS & Associates, and a letter of confidentiality. Each of these items were reasonable requests and were regarded as expressions of commitment from management to the project.

B. Pilot Site Pre-planning

This was a scheduled on-site meeting with a fixed agenda built around the BMS & Associates "Shipyard Analysis Plan." Section II of the plan was the guide for the meeting. The majority of time was spent as a work session to select and set up areas for the pilot study. Prior to the meeting, BMS & Associates had developed and forwarded the "NVAT - Potential Study

Areas". For the pilot, we concentrated our efforts on Category II-Production Support Setvices because of its unique importance to actual direct labor.

The pre-planning session was attended by BMS & Associates and key operations staff who had attended the previous site meetings with top management. It was a work session which successfully concluded with four selected areas for a pilot study. Focusing on production support services, the team defined the work performed in the detailed pilot study areas as being "pro-rated direct charges to the job; meaning that there is limited tracking and planning for each specific set of charges. Thus, the budgets for those activities were usually generated by historical calculation or estimate.

The selection process utilized some basic industrial engineering techniques of data and task analysis, including the listing of all activities ("A" General Activities") in production support services. With the aid of the industrial engineering analysis, the listing was further broken down into three sub-set categories

"B" Material Handling - Product
"C" Set-Up/Tear Down
"D" Non-Applicable for this analysis.

(Note Listings "A- D" are in Appendix P-3)

From "B" Material Handling - Product, the two following activities were selected for site pilot analysis:

Craft Material Expediter - By Craft
Temporary Lugs Bracing install and remove.

From "C" Set-Up/Tear Down, the following activities were selected for site pilot analysis:

The Set-up/Tear Down of:

Scaffolding
Temporary Power
Temporary Lighting
Temporary Ventilation
Pin Jigs- Select specific
Fixed Jig Movement, leveling, etc.

The pre-planning session was a key event in the approach to the project. The utilization of industrial engineering techniques resulted in a session of thorough activity analysis and objective selection of non-value-added categories of material handling and set-up/tear down activities. The pre-planning session format was later repeated within the project at other sites and continued to demonstrate the validity of utilizing industrial engineering activity analysis techniques, as recommended in both the "Shipyard Analysis Plan" and the "Approach Summary".

The final item for the pre-planning sessions was to plan the analysis start date and select the cross-functional representation. At the following site meeting, the project work space for BMS & Associates was defined, a direct liaison from the shipyard was assigned, and a site and time for the cross-functional briefing to area management was established. The initial set of site area interviews was also established, as well as the times for area analysis and various follow-up meetings.

c. Other Sites Initial Participation Solicitation

BMS & Associates set up initial site meetings with four of the other primary shipyards showing an interest in participation in the project. The results of the successful pilot pre-planning, as well as other communications, included a request that they review both the "Potential Study Areas" and the "Shipyard Analysis Plan". At each of the four sites, with an SP-8 panel member acting as the site liaison, detailed initial briefing sessions were held.

Each of the sessions included an overhead presentation of the NSRP, the objectives of the project, the "Potential Study Areas", the "Shipyard Analysis Plan", a BMS & Associates presentation package of background information, and a discussion of potential options. The options ranged from developing their own program, to selecting topical area analysis from the "Potential Study Areas", to verification of detailed data from other study areas.

All sessions went well and management was quite receptive to participating as the project evolved. At the second gulf coast facility, the Vice President of Operations Support was most interested in "Customer Reporting" (Ill. C. "Potential Study Areas"). The other three would support as requested by BMS & Associates.

The project then ran into the roadblock of competitive factors. The concept of BMS & Associates taking data between shipyards added a level of risk and time consumption which would not be worth the gains from any levels of

actual detailed verification. In follow-up telephone conversations, all parties agreed that sharing via the SP-8 Panel and this final report would more than suffice.

The project site work was aided by having two large gulf coast shipyards as participants, assuring good use of travel funding, time, and schedules by working with them concurrently. Each of the site contacts are, at this writing, willing to review their participation in the project.

D. Pilot Site Analysis Summary

The "Site Analysis Plan" was utilized for the pilot site analysis. The efforts of the pre-planning to select study areas and cross-functional linkages was well received by all participants. The individual selected as our liaison held a management position in production engineering and was most helpful and supportive. Moreover, he was directly involved with and respected by the various management functions selected for analysis.

Once the logistics of a site workplace and schedule plans were in place, the initial management briefing meeting was scheduled. The presentation for that meeting had been refined through site meetings at the other participating shipyards. At the meeting, the initial interviews with key managers of the pilot site study areas were scheduled.

The “Activity Analysis” (See Appendix M) survey format was utilized to conduct all initial and secondary interviews. Direct interviews and discussion with actual staff is the best means to obtain valuable data. Interviews are the key communication tool for most successful projects. The approach to the interviews was not to directly have the survey filled out. It was more important to conduct each interview with the survey as an aid for the facilitator or assigned team analyst. The persons being interviewed were given a survey form for future reference and as a guide for the type of information to be collected later.

The goal of the semi-structured interviews was to encourage open, objective input and good follow-up. We wanted to have at least two interviews or meetings with management, and also some of their key staff to work with us. The survey structure provided a format for learning about their operations and getting into the specifics needed to identify the activities involved with the targeted areas of their organization. People were quite comfortable with the survey and tended to use it to better focus their support. Perhaps most

important, however, was the value of follow-up interviews which yielded valuable detailed information regarding targeted activities.

By initially not burdening area managers to provide detailed survey data back to the team, we obtained our desired level of cooperation. With secondary interviews, follow-up work sessions, and on-site activity analysis, we gained their confidence. We also allowed each to read our pilot site weekly activity reports to shipyard management. This also provided another level of working confidence, as well as the feedback it generated.

effort, establish the guidelines for analysis, facilitate the overall process, and communicate UP, down, and sideways to keep all participants well-informed.

The following listing summarizes concerns and opportunities.

AREAS of OPPORTUNITY

Timekeeping

Training

Absenteeism

Communications

Maintenance Support

Tool Control

Build Strategy Input

Management Support

Marketing and Sales

Environmental Laws

Repair Pre-planning and Initial Docking Procedures

Figure 5

The areas listed above were extracted from the Pilot Site Analysis and were strongly verified by the other participating shipyards and members of Panel SP-8. They represent the universal output from the Pilot Site Analysis. The main industrial engineering methodologies developed and defined were:

Implementing the “Approach Summary"
Implementing the “Site Analysis Plan”
Team Area Selection
“Activity Analysis” survey format
Interviews
I.E. analysis
Follow-up communications
Cross-functional analysis and participation
Open exchange of ideas and findings

Figure 6

E. Continued Analysis and Methodology Development at Various sites

1. CDRL'S

The second major participating shipyard selected CDRL'S (Contract Delivery Requirements Listing) and MIL-SPEC'S as primary study areas. Those two areas encompass the largest embodiment of non-value-added task/activities in all shipbuilding and repair. Again the "Shipyard Analysis Plan" was utilized along with pre-planning communications and site visits. The initial site briefing included representation from all cross-functional groups.

The liaison structure was properly expanded for the CDRL analysis. A manager from industrial engineering was the project liaison and BMS & Associates facilitated and trained the trainer. Team members were from MIS (Management Information Systems), the Program Management Office, and an industrial engineering supervisor.

The enormous depth of customer requirements required a series of investigative site meetings, interviews, and presentations of systems and requirements to assure that we would be able to focus our analysis and methodology development. The analysis of direct labor-related tasks is ultra-simplistic when compared to the gargantuan maze of specifications and requirements on government contracts.

The delicate nature of our research and its potential consequences towards total job and function elimination was never totally comprehended by those with whom we met and worked. Most had worked within that environment for so long that it was difficult for them to believe that it could be eliminated. It must also be stated that the workers and the systems and procedures they had developed were all of top quality to do what was required. The pride and diligence of those involved in such areas were extremely high, but the true value of what they were providing was not for them to question.

The nature of CDRL'S is unique in that each contract has a different list of CDRL'S. CDRL definitions are not common to any universe of the customer or contractor. Each set of CDRL's represents a contract negotiation between the government and the contractor. It must also be noted that various Department of Defense agencies are involved with any single set of contracts, and that any of these may add CDRL requirements. "The buck stops nowhere!"

The project, however, was enabled to focus on non-value-added tasks/activities through application of industial engineering techniques. We were fortunate to have open access to all levels of various program offices, management information systems, and operations. At each of our nearly 25 interviews, meetings, and work sessions over at least six site visits, we encountered a genuine willingness to provide understanding and assistance with the project.

At each meeting or interview, we presented a brief background of the NSRP and the Panel SP-8 project. The existence of the NSRP was practically unknown to most of the various functions. They always expressed the feeling of their management to support any effort to reduce non-value-added tasks, as related to CDRL'S. Interviewing proved to be an integral tool of functional and cross-functional task/activity analysis.

At a shipyard that had various types of DOD government contracts, we made an initial analysis of the two major types of hulls currently under contract. The program office for each hull type gave us an overview of the contract and the series of hull numbers which were linked to a set of CDRL'S. Although the uniqueness of CDRL'S was quite evident, we asked if some specific categorization of each set of CDRL'S could be made available to our team.

We wanted a listing of all CDRL'S numerically or alphabetically, the frequency and quantity of distribution, and the process costs charged per month by the contractor. We asked the team members to total the costs on a monthly basis and then calculate the monthly percentage of each CDRL. Only the shipyard team members dealt directly with CDRL data.

The monthly percentages were reviewed by the team for further analysis which was very similar to the analysis conducted in the pilot study of specific area selection. The purpose was to select a representative CDRL that had cross-functional tasks in all levels of processing:

1. Program Office (logistics, customer follow-up communications, copying, filing, distribution)
2. Computer Systems Support
3. Operations Analysis and Support.

Coincidentally the CDRL selected with the highest percentage cost from an analysis of all CDRL'S was the pre-study target of our project liaison. The overall effort was enhanced by his knowledge of Industrial Engineering and direct association with these activities. These include the coordinating

function to gather, process and analyze data and comments. This group's efforts in future projects would contribute greatly toward the initiation of constructive changes.

The shipyard and its program management team should be commended for their efforts to reduce the impact of CDRL'S on the shipyard organization. Various past and ongoing efforts were shown and discussed with us. The level of success of these efforts was quite high, but we all agreed that we were just scratching the surface. They were fully supportive of our efforts.

Our team conducted a detailed analysis of a CDRL which was a monthly cost variance report. The kicker was that it was measured to the PM Baseline which was the baseline prior to the actual contract award and start of work (i.e.) the bid baseline. The shipyard is required to have various systems in place to capture and report the various levels of labor during the execution of contract. All systems and levels of reporting are general in specification, but specific to each contract via CDRL'S. That is the complexity of tracking systems varying by contract and contractor.

Because the shipyard had very advanced and sophisticated systems deemed necessary by the customer and audited periodically, it became apparent that many of the CDRL'S were nothing more than redundant checks and balances. Shipyards and program offices seem pushed to accept many such requirements from various uncontrolled DOD agencies, as authorized by each contract. The program office communicates directly with the customer agencies. The MIS (Management Information Systems) group tracks all actual charges and develops the required varieties of customer reporting.

Two team members working with BMS & Associates forms and procedures conducted interviews and gathered data in the formats requested. Those forms and procedures have been grouped as "Report Analysis" NSRP 8-1-91 (Appendix M). The techniques area collection of industrial engineering tools which are commonly applied in the analysis and development of systems, procedures, and indirect work measurement systems.

Each team member gathered data in those formats to the level of complexity we felt necessary. In the case of Program Office tasks/activities, the data collection and submission was purposefully less formal. They were very helpful in supplying various statistics to common tasks/activities as they related to both detailed and general analysis.

The most comprehensive cross-functional analysis was completed with considerable success after a dedicated level of effort over three cycles of the CDRL report under analysis. The extended time was a function of the workload of our industrial engineering supervisor team member. There were various interruptions ranging from proposals, audits and vacations.

At least three site visits were made to review and consult on how to best focus the analysis to gather the specific data. The analysis forms were completed for a total cross-function cycle of activity required for the CDRL. The detailed data was quite voluminous and was decided to be for client files and not this report. The output was an estimated time and frequency listing of tasks and activities for processing the CDRL. Such data is necessary to determine how to eliminate or reduce the effort.

A missing element from the site team was that we purposefully did not attempt to analyze the Computer Systems Support. They openly provided us an overview. The level of effort and commitment required to properly conduct an analysis of that function will be discussed in our conclusions and recommendations.

2. Other Sites Participation

Major Process Analysis

One shipyard participated informally by allowing a problem process to be analyzed by the application of the “Activity Analysis”. The effectiveness and workings of any major process is often taken for granted. The utilization of the “Activity Analysis” and some proper consulting during the analysis allowed for a thorough and objective understanding of what was functioning and what was not functioning properly.

The process under review was the Prime Line or ”Wheelabrator”, common to three shipyards studied. The problems, improvements, and concerns were also common. Due to various levels of downsizing at each facility, the operational effectiveness of the processes varied. The levels of support and control were all assumed to be in place, but to varying degrees, definitely were not.

Acting on assumption rather than thorough analysis would have led to improper and inadequate solutions, and wasted time and expense. By training a staff engineer to selectively apply aspects of the ”Activity Analysis”, data was gathered and categorized objectively. That information was then

presented to and utilized by management and the staff engineer to formalize a process improvement plan.

The problems discovered were as follows:

operators never trained to set up the equipment
equipment manuals not available
equipment not listed on the maintenance departments computer
no spare parts listing or control
no first article or set-up testing
no planned maintenance
no schedule control to reduce set-up and tear-downs
inadequate quality inspection procedures
no planningm parameters utilized by master scheduling
the wrong group had schedule authority
facilities and environmental changes

Should the scope of those problems be surprising? The point to be made is for a thorough, objective analysis as a baseline for problem solving. The usual tendency is to take for granted that specific procedures are in place. The “Activity Analysis" aids in verification of both functional and cross-functional statusing. Many hours are wasted when work is scheduled through a process which is out of control. Such situations cause many non-value-added tasks/activities to increase the cross-functional support of those major processes.

Environmental Activities/Tasks

The environmental function was placed on the “Potential Study Areas" listing to provide a tool for integrating those responsibilities into shipyard organizations. BMS & Associates felt that an objective analysis of environmental activities in shipyards would be proactive, supportive and educational.

Three shipyards were interested in participating with a detailed analysis. We met with all three and found that various short and long-term staffing reductions were in process, leaving little time to spare on participation. (All have left an open door for a future analysis as pressure eases.) It had been planned to utilize the “Report Analysis”. That would have provided a detailed cross-functional documentation of the current or future depth of the activities/tasks associated with environmental regulations. Some preliminary data, however, was collected and discussed with the participants.

Unnecessary Activities/Tasks performed for Customers

Example #1

In private business, the goal is to provide what customers want. In the world of defense contracting, the customer is often given more than what is actually specified; whether out of fear, habit, a desire to please, "good old boy" relationships, ignorance of the contract, changes from contract to contract, or just overzealous management by some functions at the contractor or customer. Regardless of cause, the point to be made is that any provision beyond the scope of customer requirements and specifications generates non-value-added tasks.

During the course of the project, such a set of circumstances developed within one of the participating shipyards. BMS & Associates was asked informally for assistance on handling the situation and we counseled with the staff engineer to collect all the facts. The particular problem regarded extra customer inspections relative to lR(lntemal Resistance) electrical testing. An area supervisor with whom we had worked in our "Activity Survey" had contacted the liaison for help in this example of non-value-added tasks. If we had not conducted interviews, that contact would never had occurred.

The extra tests required considerable effort to plan and coordinate, as well as to prepare various task-specific inspection documents. Craft supervision was also required to be at the inspection site and wait for the customer inspector to show for a minimum amount of time. Quite often, the customer's inspectors are overloaded and do not show up for scheduled inspections; and are not obligated to inform the contractor.

The situation is most distressing for area supervisors. The cancer of non-value-added effort seems to mushroom. All the paperwork, planning, and time involved are totally wasted. Even if the inspection took place, however, the paperwork that would flow from the contractor and customer is a waste, because the history of finding defects with that type of test is quite low. The test is also redundant with other test requirements.

The research and internal memos that followed made an important statement as to how waste can be eliminated. The research was completed in detail by the production engineering supervisor and craft supervision, gaining full support from the VP of Production. The only resistance came from the manager of Quality Assurance. The other cross-functional groups involved

were more or less non-adversarial, while being very professional and objective in the review of we data presented.

The customer was agreeable at all levels once the research was completed and verified, though it took a great deal of effort to get the Quality Assurance manager to sign off on the findings and the eventual changes in policy. Interestingly, the cost savings amounted to an average of $50,000 per hull. The un-daunting diligence shown by the production engineering supervisor and craft supervision working together on what they felt was a non-value-added task was openly supported by a courageous VP of Production. Such a level of teamwork and commitment is always required to cut out the cancers of non-value-added tasks.

Example #2

The following example is a common experience of at least five different program office staff interviewed at three different shipyards. A problem occurs when copies of specific CDRL'S are sent to too many levels and branches of the customer organization, generating waves of inquiry which require response from the contractor. The CDRL should be sent only to those offices contractually authorized to receive a copy. In practice, that does not occur. Program offices seem to operate on the assumption that the more they honor a request, the better it is. Instead, a bow wave of non-value-added critique and response is created simply by involving too many people in a process, thus, the cancer of evolving non-value-added tasks relative to CDRL distribution.

There are improvement efforts in this area by all concerned with some signs of progress and understanding, but the need for more effort is very obvious. With budget cuts in defense and a dwindling backlog of shipbuilding contracts, all parties concerned face critical cost reductions. The potential savings of reducing the frequency and distribution of CDRL's are enormous. It has been estimated via research to various organization, that upwards of 75% of program office activity could be eliminated.

F. Methodologies Analysis Summary

The basis for developing methodology in the project was the application of industrial engineering analysis and project management techniques. Through careful pre-planning and conducting interviews to gather the facts, it was possible to objectively identify specific tasks/activities for further analysis and elimination. The key point to remember in interviewing is that

the stage is being set for the future feedback and the direct participation in problem solving of those people in the problem areas who know best where the problems are.

To just conduct interviews, fill out forms, and obtain quick savings is a mode of short-sighted management. To setup a network of employees trained in the techniques of eliminating non-value-added tasks/activities is a long term perspective of continuous improvement. Whether in the areas of production, customer support, quality, sales, service, computer systems, accounting, or government regulations, the cancerous nature of non-value-added tasks/activities require a total understanding of operations and authentic commitment. Part of that commitment is the realization that nothing is sacred when it comes to reducing wasted effort and resources.

The necessary approach requires top management participation and a facilitator function. The facilitator function is required to provide and maintain objectivity during the analysis of the targeted, organizational functions. The current utilization of cross-functional teams in TQM programs would have an improved impact if industrial engineering methodologies were utilized. The objective of most quality circles boils down to “How to use information to make decisions”. The methodologies from this study focus the analysis to specific information and formats.

The decision processes of the activities/tasks are dissected in order to provide a comprehensive knowledge of how to best utilize the data for elimination of the non-value-added tasks/activities. The methodologies provide the team with a strong, cross-functional interface within the workplace. Add to that an open-minded willingness to change from a non-value-added mode to a truly productive mode, and the baffle to eliminate wasted effort and resources is well on the way toward a favorable resolution.

ELIMINATION METHODOLOGIES SUMMARY

Overview:

The elimination of non-value-added tasks in U.S. shipbuilding is a major requirement for obtaining global competitiveness. The objective of the project was to deal with methodology development and not to complete any specific implementation or elimination ofidentified non-value-added tasks/activities. The project wassuccessful in that it was able to work at a high level with at least five different shipyards to develop methodologies for their future application.

Understanding the scope of the analysis and commitment necessary to obtain an objective cross-functional analysis and implementation is unconditionally required from shipyard top management. The beliefm that there are no "sacred cows", an open commitment to reductions in CDRL'S and Mil. Spec's, and a genuine trust in the ability of those down in the trenches performing the analysis, are all reflections of what is required from shipyard top management in order to reduce wasted effort and resources. There is no escape from the many difficult decisions required to achieve any level of success.

A. Background

Private and public U.S. shipyards have been in a serious baffle for survival. Downsizing has hit hard in shipyard support areas and has increased the responsibilities of those employees who remain. Expenditures are greatly curtailed and only contractually required improvements are made. Such conditions have contributed to working environments that are less than productive.

Various private and now public shipyards have greatly reduced production technical support such as industrial or production engineering. In some instances, those organizations only exist in title. It is very significant that those functions which are considered vital elements of many manufacturers have been relegated to providing documentation for CDRL'S or other bureaucratic tasks instead of analysis, development, and implementation of improved methods and processes. The lack of progress in the application of concurrent engineering is a disturbing indicator of the short-sighted priorities under which most private shipyards have operated.

The program office has become the central group which determines what should be accomplished at a shipyard. That has happened as a result of the

customers bureaucracy spawning an identical bureaucracy in shipyards. Neither bureaucracy has ever dealt with basic shipbuilding or repair requirements in an objective manner. Each shipyard has become merely a supplier of facilities, labor hours, and voluminous piles of paperwork. Some levels of this paperwork are valid and required. But there has evolved a great deal of redundancy and over-lapping of reports and formats which has driven these volumes of paperwork requirements upward. It matters not that someone thought that it was done in the interest of national security. What matters is that someone forgot all about pride and productivity.

B. Project Activity

The subject of eliminating non-value-added tasks/activities was a topic of all the initial meetings with management from each facility we worked with. The consensus was that the project would set the stage and provide them with methodologies. Any findings or changes which might occur as part of this project were for internal use and publication. That allowed for a very open and non-confrontational methodologies development. Moreover, as the project developed at each site, management did get involved and supported the approach and potential application.

Many of the various study results gathered by the analysis teams proved management assumptions regarding operations and processes to be invalid. That created some defensive posturing at times; but then there were better times, such as two formal presentations of results to shipyard management which identified specific changes and annual savings in the range of two to four million dollars.

c . Recommmended Elimination Methodologies

The basic requirement is commitment from top management. The definition of elimination must be expressed as a direct cost elimination, a reduction or improvement of tasks/activities, the substitution of tasks/activities, or the elimination of the requirement. The substitution option provides the most support for continuous process improvements.

The application of our focused “Approach Summary” and the utilization of a third party facilitator is best for any initial program. Activity should be unconditionally staffed throughout the organization with the utilization of teams applying the methodologies. In fact, an organization could augment their current TQM or suggestion program with a non-value-added task/activity identification and elimination program.

The ”sacred cow" problem must be handled in factual reporting of team progress. For example, steam clearly identifies ten tasks/activities for elimination, but only four of the recommended action plans are implemented. For each of the four implementations, the cost savings are tracked, but unfortunately that is where most programs stop. The real key to continuous improvement is to get going on the other six recommended action plans and track their progress. Full disclosure tracking earns management support and keeps the entire effort in focus.

When applying the "Activity Analysis”, the team will summarize in a self-determined format what tasks/activities - have been identified as non-value-added. The team will then research and document the incremental and total cost of the tasks/activities. The “Recommended Action Plan” outlines potential savings and summarizes cross-functional tasks/activities with their costs. The utilization of an organizational chart to trace the tasks/activities being analyzed, as well as what costs are associated at each level of activity, provides a useful tool for all aspects of continuous improvement.

The “Project Approach Summary” is the tool by which top management and the analysis team are united. By adherence to such an approach, an organization can progressively and continually improve their competitiveness. Likewise, value engineering is a proven methodology by which various industries improve their product costs. When we were seeking forms or formats for cost reductions and changes, we found the U.S. Navy Value Engineering procedures.

We recommend using the “U.S. Navy Value Engineering Applications and Contractual Implementations” (published by Analysis and Technology Inc., 6-90). The applications and methodologies of value engineering are very well stated. Value engineering is not quite synonymous with “Identification of Non-Value-Added Tasks”, although they both are applications of engineering techniques. The point is not the title given for activity analysis, but that it is being done and will yield positive results.

The U.S. Navy Value Engineering Program has been most productive in the last few years and is strongly recommended to be applied at all shipyards as part of a concurrent engineering approach. Currently, many value engineering changes come from production when it is often too late then to obtain a maximum level of improvement.

Another valuable source of information is the “Methods Improvement Workshop for the Shipbuilding Industry” (September 1990, NSRP 0328). It is a summary document of the most successful series of NSRP Workshops presented throughout the eighties at various sites with hundreds of industry operations staff attending. The industrial engineering techniques presented are basic to any thorough task/activity analysis. The report and its presentations are available via the NSRP.

The SP-8 Panel has approved a project for FY93 entitled, “IE Methods (processes) Workshops". As part of a two-day session, the NSRP 0328 Methods Workshop will be updated to include the latest developments in process improvement.

TASKS/ACTIVITY REPORTS FORMATS

ACTIVITY LISTING

DEPARTMENT:_____ DATE:_____ PAGE___ OF___

ACTIVITY #	ACTIVITY DESCRIPTION		ACTIVITY DRIVER	# OF DEPARTMENTS	VALUE LEVEL CODE	COST OF ACTIVITY
TOTALS						

Report Format 1

SAMPLE TASK/ACTIVITY REPORT

DATE:_____ PAGE _____ OF ____

DEPT	ACTIVITY #	ACTIVITY DESCRIPTION	ACTIVITY DRIVER	ANNUAL COST	VALUE ADDED	NECES.	OUTSRC.
SUMMARY & TOTALS							
TOTALS							

Report Format 2

NVAT SAVINGS REPORT FORMATS

NVAT SAVINGS SUMMARY

DEPARTMENT:_____ DATE:_____ PAGE____ OF ____

ACTIVITIES IDENTIFIED	ACTIVITIES ANALYSIS STATUS			IMPLEMENTATION STATUS			SAVINGS		NOTES
	REVIEWED	COSTED	PROJECTED SAVINGS	SCHEDULED	START	COMPLETE	TO DATE	AVAILABLE	

SUMMARY & TOTALS									

Report Format 3

NVAT PROGRAM SAVINGS SUMMARY

DATE:_____ PAGE____ OF ____

DEPART #	ACTIVITIES IDENTIFIED	ACTIVITY ANALYSIS STATUS			IMPLEMENTATION STATUS			SAVINGS	
		REVIEWED	COSTED	PROJECTED SAVINGS	SCHEDULED	START	COMPLETE	AVAILABLE	TO DATE

SUMMARY & TOTALS									

Report Format 4

v. RELATIVE DISCUSSIONS

A. Areas of Opportunity

Many of these items came from interviews with direct supervision. These are not prioritized yet were found to be consistently brought up as items taking away from their doing their job.

Timekeeping:

Timekeeping was the most common area of filtration at three shipyards participating in the project. Extensive timekeeping requirements on DOD" contracts have infected government contractors with a burdensome bureaucracy. The infection, caused by a lack of trust, has bloated levels of staffing and lost time throughout the organizations of defense contractors

The most important responsibilities of a supervisor are work assignment, coaching, planning, and the coordination of materials, information, and tooling for the work at hand. Since the time to fulfill those responsibilities is very limited, any requirements which take the supervisor away from those responsibilities directly impact work processes and cause compounding waves of non-value-added effort.

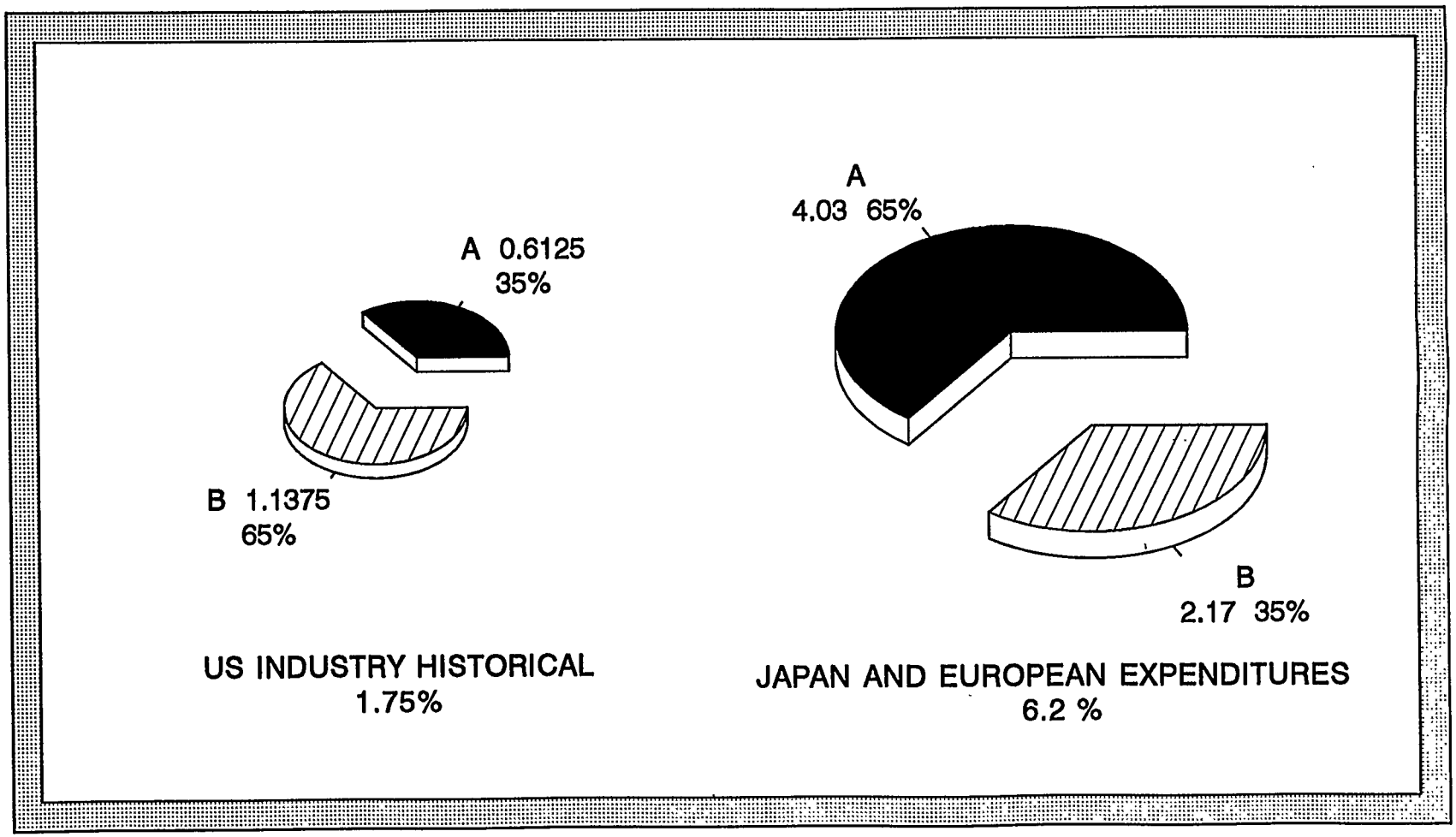
Training:

All participants expressed the concern that a lack of training causes many non-value-added tasks to be generated. Below is a graph which compares the investment in training by U.S. Industry and the European shipyards we visited. The fact is evident that U.S. expenditures and their distribution are inverse and three to four times less than that of foreign competitors.

The effects of insufficient training are harsh on an industry which is already operating on a tight budget. Front line supervisors are asked to perform the work at hand with lean crews, minimal training resources, and continuously changing schedules. The critical match up of trained staff to specific tasks is not regularly attainable therefore quality, budget, and schedule performance are impaired with a continuous addition of non-value-added tasks to the workload.

TRAINING AS A % OF TOTAL EXPENDITURES

DISTRIBUTED EXPENDITURES A & B
CONSENUS OF PRINTED DATA LAST TWENTY YEARS



A = PRODUCTION AND PRODUCTION SUPPORT
B = UPPER AND MIDDLE MANAGEMENT, PLUS

NVAT N8-91-1 BMS & ASSOC. Figure 7

A basic tool for identifying training requirements is shown in (Fig. 8 Staff Skills Inventory) which is recommended for the identification and elimination of non-value-added tasks. Training and work assignment are the two most important functions of line supervision. The lack of investment in training is bad enough, but to invest more in white collar training than in blue collar training is to fuel the largest generator of non-value-added tasks in shipbuilding.

The final comment about training relates to the training that is required by government regulations, as well as basic skills training for general and specific shipyard tasks. Some facilities where work is performed primarily outdoors send employees home when it rains, while maintaining classroom training schedules which take workers away from production in good weather. The recommendation was made to "train in the rain", which would require the ability to train on short notice. Such a practice not only applies to weather conditions, but to other work interruptions such as equipment breakdowns or material delays.

Absenteeism / Turnover:

The indicator we utilized to broadly seek out non-value-added tasks in shipbuilding was adherence to the master schedule. At all of the facilities, the master schedule was revised at least five to nine times per year; with every revision generating non-value-added effort. A contributing factor of slipped schedules is absenteeism. The planned or standard rate of absenteeism, including vacations, ranges from 7%-12%. The rate at private shipyards participating in this project ranged from 18%-28%; and 17%-24% at the public shipyards.

Customer changes are the most common cause of schedule revision at most of the private shipyards. The consequences are greatly compounded with the training, absenteeism and turnover issues.

STAFF TRAINING FLEXIBILITY MATRIX

Page: of

Department:_____ Section:_____ Supervisor:_____ Date:_____

Tasks/Skills										
Employee/ID Number										

Status Code:
C = Certified/Highest level can train others
T = Trained and competent

IT = In training
TS = Training approved and being scheduled
NT = Not trained or approved for training

Status
Date

Notes:

BMS NVAT 8-92

Communications

Shipyards are large facilities with many work areas of difficult and limited access, creating serious communication problems for front line supervisors. Similar to the low budget priority status of blue collar training, the low budget priority status of blue collar communications technology results in lost time and rework. The front line needs the best communication technology available. A recommended solution is the establishment of a department dispatch center with telephone communications and a job board; which could be upgraded with supporting scheduling systems on networked personal computers.

Maintenance Support:

The maintenance function is central to the success of any shipyard. when work processes are halted due to breakdowns and extended repair cycles, the inevitable schedule slippage begins to generate non-value-added tasks. Three key aspects germane to the maintenance support issue were widely discussed and reviewed in detail with some of the maintenance functions during this project. Maintenance budgets sometimes dictate policy to the extent that overtime is not authorized for the repair of production equipment needed to meet critical schedules.

Maintenance often has difficulty in scheduling work during a forty hour workweek because planning groups and production trades claim priority. We offer the solution of split shift maintenance planning, which would provide a minimum of two to four hours before and after selected shifts for maintenance. Another valid point is that those who perform the work should take responsibility for the equipment and should be properly trained to do so.

The difficulty of maintenance departments with limited budgets to retain qualified staff is compounded by the high level of training required to maintain the various types of equipment under their charge. To work with a skeleton crew forces many compromises in work assignments, each compromise translating directly into non-value-added tasks. A properly funded, trained and staffed maintenance function can prevent many non-value-added tasks.

Tool Control:

Tool control at shipyards vanes from laissez-faire policies to strict, bureaucratic regimentation. Tool control is a management responsibility which must have the same priority as piece parts. The advances in

technology for tool planning and control should be provided to front line supervision.

Build Strategy Input:

Many of the front line supervisors we interviewed felt that planning was accomplished like budgeting - just look at the parts and give them x number of hours. Even specific block planning does not always utilize the best methods and equipment available. Many hours of lost time are created by scheduling work in a manner which forces more handling and less access to various types of support equipment or functions.

With many shipyard functions operating at skeletal levels, time for coordinated planning is often not available. The standard industrial engineering practice of learning from those who do the work should be directly applied to the formulation of build strategies. Many MRP systems have been loaded with various build strategies, but must be updated and reviewed with front line supervision for each hull or major contract. Without such updates from those who are closest to production, many non-value-added tasks will be generated by old assumptions which are no longer valid. In order to do "the right things right the first time", products and processes must be designed concurrently.

Management Suppo

Schedule attainment of high quality work within budget is the primary objective of production. To meet that objective requires that a high level of management support be demonstrated in resolving many of the problems previously addressed in this section. Management support will be adequate when management priorities translate directly into productive action by being consistent with the real needs of the workforce and shipyard operations. That simply cannot be compromised.

More Business For Shipyards:

Lack of work makes for a future that is quite undefined. That concern was prevalent in the shipyards participating in the project. At the same time, cause for hope was seen in their recognition of changes that could improve operations. U.S. shipyards want to go forward with the challenges and opportunities for change, but they need a backlog of work in order to make that happen.

Environmental Laws:

The advent of environmental regulations for shipyards has generated non-value-added tasks and activities. Strict training requirements, enforced with fines, have caused the reduction of other types of formal training for which there is no budget. Environmental laws have a basic, compounded, negative effect demonstrated by the non-value-added tasks and activities directly and indirectly generated. The upside is that some of the pre-planning and build strategy exchanges which environmental regulations require will" improve shipyard operations in the long run.

Pre-Planning Repair And Initial Docking Procedures:

An area of concern at a public shipyard was the extensive amount of detailed pre-planning required by NAVSEA, most of which is of little value once the ship is docked. Major reasons for the mismatch of pre-planning to actual work are directly related to budgetary constraints for the fleet which have ruled out adherence to scheduled maintenance procedures. Also, each captain has final approval as to what wiII be done at each docking.

Recently, environmental regulations of various types have impacted both military and commercial repair activity. Pre-planning procedures are currently being reviewed and revised for all sectors of the industry. All local rules and regulations must be addressed prior to the repair needs of the ship. The pre-planning activity and the predocking onboard audit team has an environmental checklist as its planning document, putting the repair work definitions on hold in quarantine. The captain, either military or commercial, does not know what his budget constraints will be until the scope of environmental activity is defined.

Since this is a currently evolving change, not all of the new procedures for planning and controlling repair work have been finalized. We recommend that the onboard predocking audit team include shipyard staff planners. The planning team could identify, plan, budget, and schedule the repair work while various inventories and statusing are being performed onboard prior to docking. Focusing on not adding any bureaucracy, a combination of near-term planning, PC technology, and teamwork could replace the non-value-added effort of repair pre-planning.

B. European Analysis: Relative Importance

Preface:

BMS & Associates wishes to thank all those we visited at European shipyards. and BIBA University for their time and efforts. Not only should they be thanked, but praised for the progress they have brought to their specific organizations and the European shipbuilding community.

Background:

Foreign analysis was made a requirement for this project at the SP-8 Panel meeting during abstract review and prioritization. Initially, it was though that Japanese shipyards should be visited because of their superior facilities and processes, as well as their prominence in commercial shipbuilding. Fortunately, our trip research revealed a history of communication problems, protective agendas, and a lack of candor on visits to Japanese facilities. The cost and time required were also factors for not conducting research for this project in Japan.

Our preparation to conduct research in Europe was supported by staff members of two U.S. shipyards and NSWC-Carderock Division, who had recently visited European facilities and supplied us with internal trip reports and European shipyard contacts. The final planning and contact confirmations were made during the 1992 Ship Production Symposium in New Orleans, LA; where two direct contacts for the trip were made.

The objective of the trip to Europe was to determine from our concurrent analysis of non-value-added tasks if the recent progress of selected European shipyards displayed relative “lessons learned”. The answer was to be a definitive “yes”. Moreover, we did receive candid and in-depth information on all visits within the European shipbuilding community.

The logistics and planning did require more of an effort than anticipated. A primary factor of the trip’s success was that our trip research enabled us the valuable opportunity of linking up only with English-speaking key contacts. The trip was made without shipyard representation because no U.S. shipyards, NSRP administrative staff, or vendors had staff or funds available.

Travel Itinerary

(Departed 6 October 1992- Returned 15 October 1992)

Facility	Date
Odense-Linde, Odense, Denmark	10-8-92
Burmeister & Wain, Copenhagen, Denmark	10-9-92
HDW (Howaldtserke-Deutsche Werft Shipyard) Kiel, Germany	10-12-92
Bremen Vulcan A/G, Bremen, Germany	10-13-92
Meyer-Werft Shipyard, Pappenberg, Germany	10-14-92
BIBA University, Bremen, Germany	10-14-92

These visits ranged in time from three to eight hours of on-site activity. Each visit was pre-planned. An important part of that effort was to send the following:

"Tasks for Overseas Analysis" (Appendix P)
"Project Objectives" (Appendix P)
"Value Level Definitions" (Appendix P).

Each facility used that data to prepare for our discussions. Our notes from those discussions are attached as, "European Site Data Collection" Appendix S). Shipyard tours were included with each visit. HDW had the largest percentage of military work (38%), with most of the other shipyards having work backlogs that were exclusively commercial.

General Summaries of "Tasks for Overseas Analysis"

The following list was developed from our concurrent work with U.S. shipyards. The listing represents the areas of concern in the European shipyards visited.

Timekeeping:

Timekeeping was a concern of direct labor supervision, but with a lower level of frustration than in U.S. shipyards. Many of the yards dock in and clock out all

employees, however, they are not burdened with the extensive timekeeping requirements of DOD contractor. They are progressing with bar coding badges and work orders at a surprisingly rapid rate.

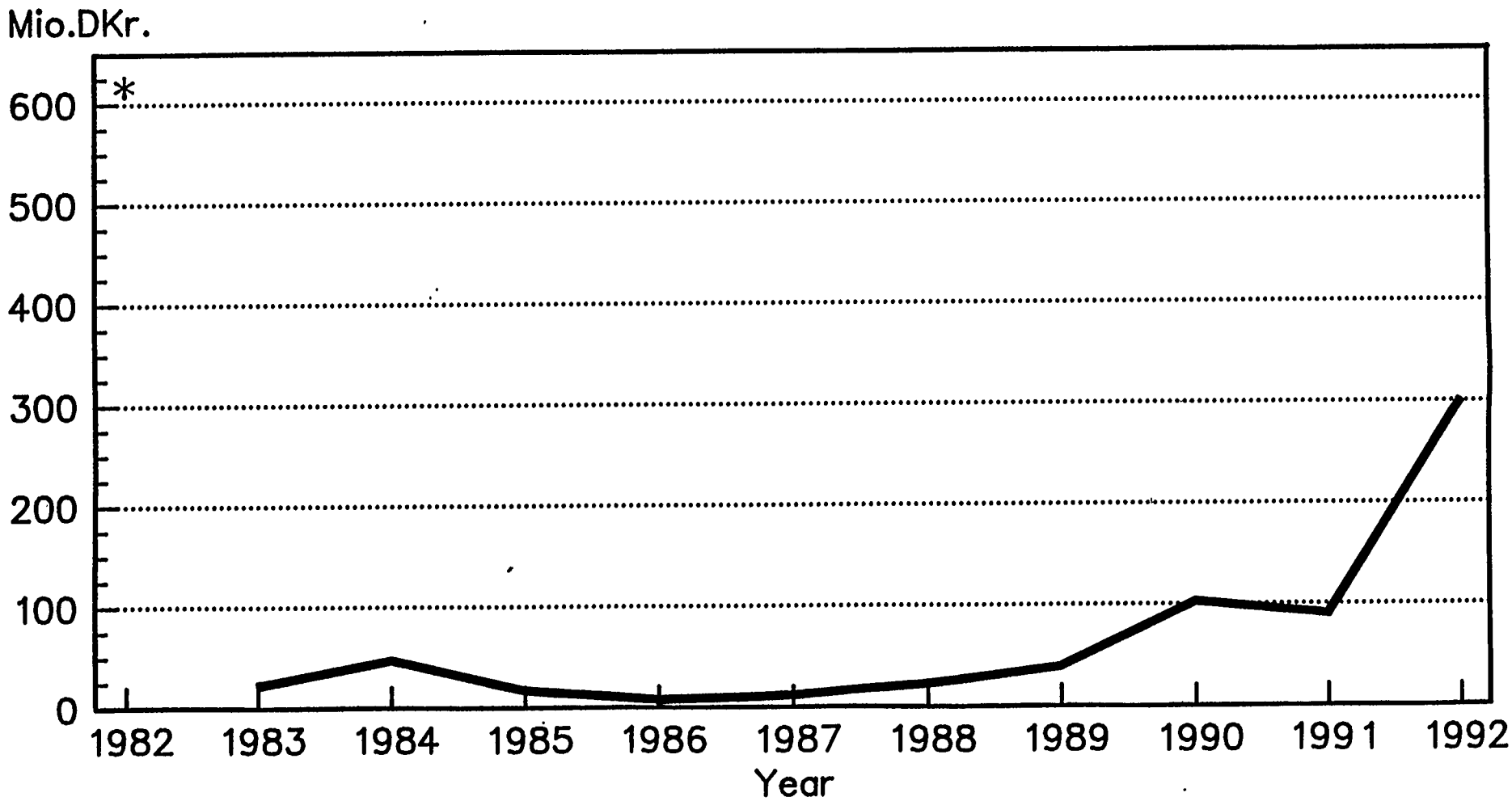
Maintenance and Capital Facility Expenditures during the Last Twenty-Five Years in Five-Year Increments.

The definition of non-value added tasks, as presented in this project, is relative to the capital and maintenance planning required in an ideal shipyard facility. We developed the two-art survey and cover sheet "Facilities/Site Maintenance Overview" (Appendix S), in order to gather and tabulate such data. We requested that four U.S. shipyards supply data, but not one responded.

The European shipbuilding community very openly provided some excellent specifics and commented on the vital importance of maintenance and facilities planning. An example of the positive response and cooperation was demonstrated in the fact that Odense-Linde had prepared various graphs specifically for our meeting. Two of these are shown as follows

Major investments

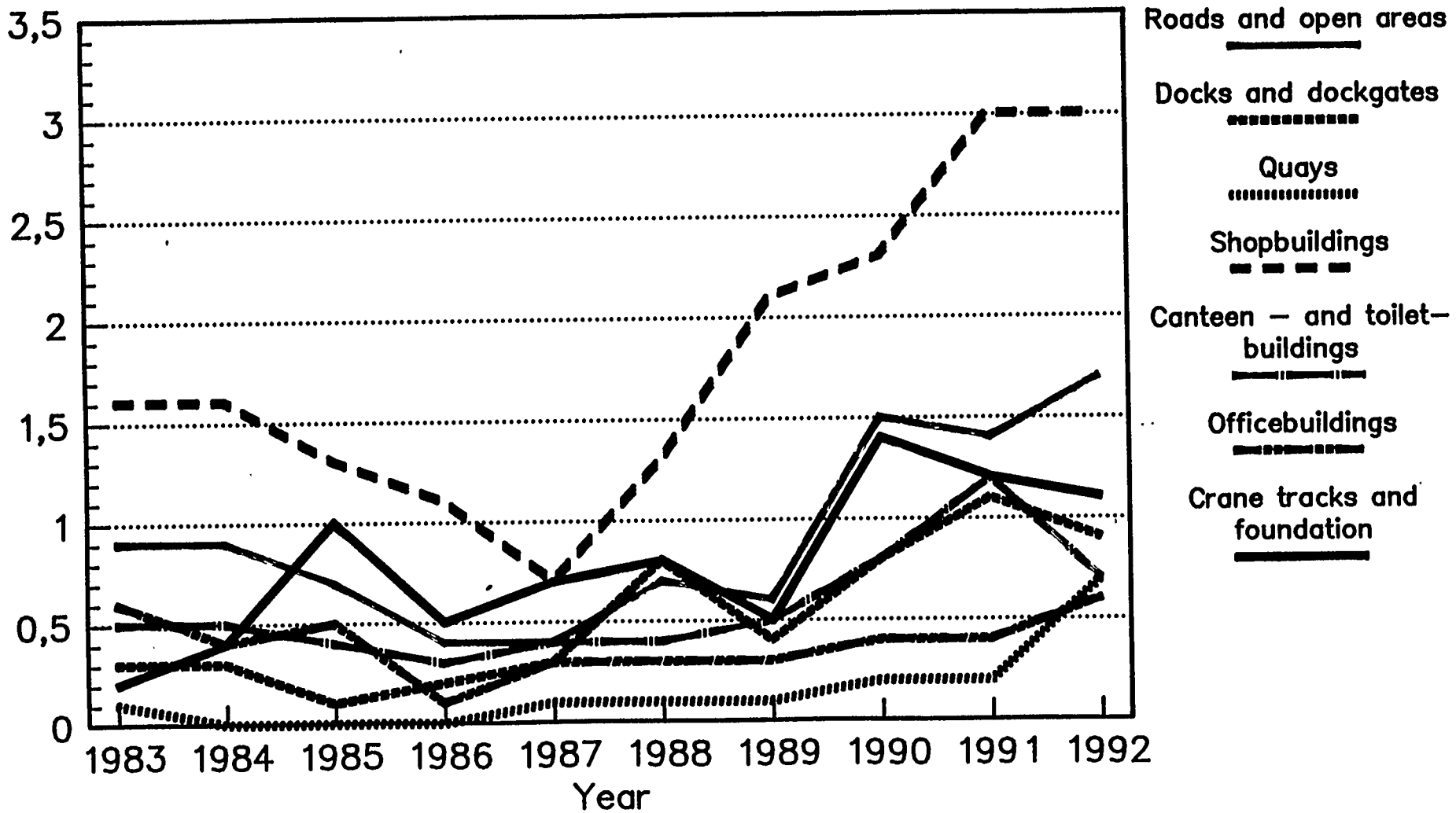
(taken into use)



c:\fl\gcg\investm.drw

921007

Maintenance costs



c:\fl\gcg\cost2.drw

921007

The foregoing charts clearly display the capital and facility planning required to effect major change in a shipyard. They also reflect a strong commitment to establish and maintain a facility with "touch once" process flow. Such commitment is most relative to the ideal shipyard, as described in our definitions. The focus of revamped process flows is to reduce and/or eliminate non-value-added tasks and activities.

It is important to note that a common capital investment in material handling was for ASAR (Automatic Storage and Retrieval Systems) throughout all facilities. It has been recognized that ship construction material planning should utilize staging on pallets. With large scale ASAR Systems, pallets are stored efficiently and only moved when required at the job site. All under computer control, many non-value-added costs associated with continuous movement have been eliminated; such as storage space, damaged material, lost material, and excessive papework.

Build Strategy and Planning Initiatives During the Last Twenty-Five Years:

All shipyards visited have undergone a total facility recapitalization and have incorporated continuous changes in their planning. The main improvements in recent years stem from the application of CAD/CAM technology to the production of ships.

Each build strategy is based upon processes and workflows for related products. The historical power base of engineering or a hull structural department in U.S. shipyards is uncommon in the organizations of European shipyards. The major element in common was that all drawings and documentation were focused on the concept, “how to build the ship in this facility.”

A simple explanation of a successful planning system was presented in detail at Odense-linde. After reviewing the history of planning at their shipyard (Appendix O), their integrated “ABC” system was discussed in detail. Our host Mr. R. Fonseca, headed a production engineering and planning function staffed with 160 people.

ABC Planning Overview

Planning is broken down into “A”, "B", and “C” level plans. The “A” level, ship production plan, is developed by managers of production and design and includes any facility investments required to improve productivity. The”B” level plan develops schedules, methods, and budgets based upon rates for activities. At that point, wages for the duration of the contract are negotiated with the workforce. If the workforce exceeds the productivity goal contracted, they are paid a bonus. The “C”

level plan level-loading the workstations ineffective because the CAD/CAM drawings are structured specifically to the production of the ship.

All shipyards had extensive computerized planning systems in place. The system at Odense-Linde was developed by the shipyard and is quite impressive. The demonstration of their ABC system started from the corporate war room which displayed all the "A" level plans. A hull planner called up a workstation for sub-assemblies on the computer. The schedule on the computer screen showed all sub-assemblies from all hulls scheduled for that workstation. Each sub-assembly had a schedule, budget, and manpower. When the planner moved the schedule of one sub-assembly one week to the right, the program automatically recalculated weekly manpower and budgets. Progress monitoring is also computerized to the operations level utilizing a LAN (Local Area Network). The systems are summarized and statused weekly by the computer to aid in assessing deviations in schedule.

The heart of the system is the production engineering and planning functions which assure that all of the necessary elements are in tune for a smooth production run. That capability, in itself, is why Odense-Linde is considered by many to be the best shipyard in Europe. The people at Odense-Linde were open, proud of their achievement and very professional in their approach to build strategy and planning.

The other shipyards have utilized computers very well at all levels to simplify their planning and statusing, but they are not burdened with DOD reporting or tracking requirements. Most important, however, is that the technology of CAD/CAM is utilized to produce drawings and instruction packages which focus on how to build within the workflows and processes of the shipyard.

Efforts are underway at BIBA to improve the linkage of computer technology to shipyard production. CAD/CAM and other platform integration within the framework of common requirements of shipyard production operations are being evaluated. Their work with the European shipbuilding community is timely, well coordinated, and well received.

Methods For Production Inputs to Overall Strategy and Specifically to Build Strategy:

Most of the shipyards have utilized concurrent engineering principles in their efforts to gain market share. That is very evident in the recapitalization of facilities and the development of integrated planning systems, all of which focus on how build the product and what is required to improve productivity.

Most of the shipyards involve the workforce the formulation of a work contract to each specific build contract. That is part of the bid for the contract award. The

workforce, therefore, has a significant voice with positive incentives in contractual matters affecting productivity and the attainment of new work.

The staffing of various planning and production engineering positions comes from the production wotkforce; not from outside of shipbuilding. Trainees are educated to utilize computers to translate their shipyard knowledge.

International standards Utilized:

The most significant factor in the European shipbuilding community is that all shipyards are working toward a common set of shipbuilding standards. All aspects of design, production, training, and quality are based on the same set of standards. That puts them far ahead of U.S. shipyards having to deal with ever changing DOD contract requirements, as well as not having been in the international commercial shipbuilding standards community for twenty years.

Our inquiries into that issue were curtailed to avoid any conflict with the priorities of the SCA (Shipbuilders Council of America). Mr. Rick Thorpe of the SCA, had meetings planned with some of the same people we visited. His topic was specifically international standards.

The importance and advantages of operating with a common set of shipbuilding standards are critical for the elimination of many non-value added tasks and activiies. U.S. shipyards must proceed without delay to adopt common standards to enhance their ability to compete globally.

Training Budgets:

The total commitment to a well-trained workforce was evident in all facilities. The previously presented graph on U.S. training versus foreign training was statistically borne out by each facility visited. The European shipbuilding community is dedicated to maintaining and improving its apprenticeship programs stall levels with an investment ranging from 5.9% to 7.4% of the total annual budget. Blue collar . and production support functions comprise almost 80% of the training budgets.

It is important to note that the average length of employment of skilled workers in European shipyards ranges from 12 to 15 years. To attain that rate of turnover in U.S. shipyards would preclude the various cycles of non-value-added tasks and activities that are generated by inadequate and misappropriated training budgets.

Absenteeism/Welfare overview

Absenteeism was relative to the location of the shipyard. In Copenhagen it was greater than in a shipyard-dependent community as Odense. Goverrnmental support regulations are not as liberal U.S. weffare or unemployment criteria, and the improved work backlogs over the past ten years have stabilized the workforce. Because of abundant work and the proximity of shipyards, there is healthy competition for the best-paying positions. Unions and craft alliances provide a positive influence in the industry..

Staffing Discipli ne Flexibility Analysis:-

The ability to plan and assign work to a workforce which is well-trained is a competitive edge in any industry. Already discussed has been the generation of non-value added tasks and activities which occur when a workforce is not properly trained. The European shipbuilding community really understands and applies that principle in dramatic ways to eliminate non-value-added tasks and activities.

There is extensive cross-training at the supervisor level. Another key element utilized is out-sourcing of work; ranging from shipyard maintenance to outfitting and welding. That allows the scheduling of resources rather than resource levels dictating “make work” scenarios. As mentioned before, major factors in creating staffing flexibility are the backlog of work and geographical proximity of the shipyards.

Customer Reporting and Change Control:

Of special importance to establishing a focus on improving produttivity is the fact that extensive reporting or tracking of cost and schedule performance is not necessary if a shipyard and ship owner agree up-front on a detailed contract. ” Supporting that contention is the straightforward nature of designing and building ships within the guidelines of an established set of standards. The method of assuring that those standards are met involves Customer representatives monitoring quality and progress on-site.

Actual customer reporting is limited to monthly schedule statusing. Any major problems have a prescribed method of handling. The issue of change control is most often handled with half a sheet of paper containing specific questions relative to the impact on cost and schedule.

Repa Prepair preplanning and Docking Procedures;

Very little repair work was done by the facilities visited, Pappenberg had the largest volume of repair and modification work. Such work was performd off-line and utilized out-sourcing.

Constraints of Environmental Laws:

The passage and enforcement of environmental laws in Europe seemed surprisingly well-managed, understood and accepted. The shipyard work environments were designed and are continuously improving to become environmentally safe.

The VOC emission standards are not in place, but paint formulas have been substituted. Future problems will occur with run-off and other water pollution issues. Most of the facilities have submerged plasma equipment and are mindful of the processing and monitoring of the water involved.

Brief Thoughts on Each Facility

Again, we must express our gratiiude and respect for the dedication and progressiveness of all those we visited.

Odense-Linde:

Dedicated capital revitalization of facilities and planning systems

Their marketing videos are a must for review by U.S. shipyards

Target costing and workforce contracting

Tack systems for sub-assemblies

Burmeister & Wain:

The separation of the shipyard production organization from engineering and marketing should be evaluated by all

The target costing and workforce contracting

The unique statusing of work lwhereby planners status the level of completion and the supervisor is responsible for the time expended. They, together, must respond to variances

The flexible planning elements of facilities and processes to handle product changes

The enforcement of design for only one curve per surface

Tack system for sub-assembly

HDW:

We talked with the military side of the house which presented a strong case for international standards

Their comments as to the amount of paper required for DOD work was that it was just a welfare program to keep people employed in the U.S.

Not only do they out-source, but also import specialists for specific processes

Bremen Vulcan:

Finally to see the fruits of their revitalized facility and workflow investments

Government support ends as they go into operating 'in the black'

The elevation of young technical staff and association with BIBA was most impressive

Meyer-Werft - Pappenberg:

The real "Ship Factory" with its enclosed drydock and modern cutting and panel lines

Out-sourcing and use of sub-contractors

The purchase of pre-primed panels precludes a prime line process

The tack system for sub-assembly. A tack system utilizes basic industrial engineering assembly line concepts to move the assembly from point to point at prescribed times. All the work is planned for that period of time per module and station. That forces planning and coordination for all involved. Again, the workers contract for the hours required to accomplish tasks.

This facility now can produce a passenger ship from start to sea trial in nine months!!

BIBA:

Extensive integration of high technology and industry for the support of ship" productivity

A proper perspetiive and relationship to industry

Their Conference 11-91 on 'New Apprpaches Towards One of a Kind Production" .

SUMMARY

Recapitalization of facilities and revitalization of organizations and planning to continually improve cost and schedule performance

The use of international standards as the basis for doing business

The dedication to CAD/CAM technology

The wise application of out-sourcing and sub-contracting

The dedication to training and apprentice programs

The adaptation of ASAR Systems for pallets of material

The dedicated integration of various modem production processes for welding, cutting, outfitting and erection

The openness of the European maritime community, inclusive of shipyards, ship owners, operators, and universities

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

This project was successful in meeting the objectives of (1) shipyard participation and (2) establishing non-accounting techniques to identify non-value added tasks within the shipbuilding community. Moreover, the project was able to couple the identification and elimination of non-value added tasks with industrial engineering analysis techniques toward improvement of methodologies for future work.

Tools such as the "Approach Summary" and the "Site Program Procedure Flow" have been shown in the project to be highly effective applications, but only if supported with the commitment and participation of top management throughout the effort. Another essential requirement for the effective identification and elimination of non-value added tasks and activities is the objectivity that can best be provided by a knowledgeable "third party" facilitator.

The most obvious area with a large savings potential is the paperwotk associated with government contracting. The expanse of the "cancer" is so great that it is frightening. The savings available can be achieved in many constructive ways through good project management and, most importantly, the unwavering commitment from top management. These savings are extremely difficult to bear with only one customer, DOD. Such were identified in this project, a simple elimination strategy was agreed upon, but not carried out by shipyard management, due mainly to the current mood of the customer.

The following Productivity Chart # was presented informally at the March 1993, NSRP Panels SP-4 and SP-6 joint meeting at Newport News Shipbuilding. The chart data is from one of the European Shipyards this project visited. We conclude that since most of the US shipbuilding in the last twenty years has been from the US Navy, that at least 60% of the differences shown in the chart data would be found to be from "non-value added tasks". Moreover we are confident that we would probably be able to support this conclusion with a detailed select analysis. (Such an analysis should be funded somehow.) These statistics we conclude are a direct result of our stated "joint non-value-added existence" for both the customer and contractor.

PRODUCTIVITY

(MH/CGT)*	EC	JAPAN	US
Best	26	20	60+
Average	44	23	82

*Manhours per ***Compensated Gross Ton***

Figure 8

The "Areas of Opportunity"discussed, provided a realistic insight into the concerns of front line shipyard supervision. Their consensus need for improved tools and techniques toward their functions would help them do their true supervisory tasks. Their openness and willingness to work with new ideas was most commendable and should be more appreciated. The group as a whole is looking for true support and leadership from shipyard management. This would include more true Industrial/Production Engineering support functions in shipyards.

Many U.S. shipyards have experimented with and failed in the application of Quality Circles and Total Quality Management programs to establish "teamwork" in problem-solving and to upgrade "quality" by enhancing internal and external customer relationships. Such initiatives have failed because concepts such as teamwork and quality have not been recognized as ends in themselves, but the results of many contributing factors in shipyard structure and operations. What is needed is a means offocusing objectively on those factors to determine which are disruptive and wasteful. This project has demonstrated that capability.

Though most shipyards realize the need to improve cost and schedule performance to be competitive, it also must be realized there can be no "sacred cows." Every aspect of organizational structure and operations must be analyzed with the objective scrutiny provided bythe industrial engineering tools and techniques developed in this project. European shipyards have been better able to improve productivity by identifying impediments to

workflow. This strongly correlates to them having done a better job of utilizing the principles and techniques of industrial engineering. They have not regarded industrial engineering as an expendable "support" cost, but have capitalized on its essential value to their operations.

Paperwork reduction is a common concern and should be addressed in any effort to identify non-value added tasks and activities. The greatest payback potential, however, is in the analysis of the functional and cross functional processes in shipyard operations. The "Activity Analysis™ is specifically tailored to define the status of each process. A common but costly error is to" assume that processes are working as planned, or dictated, rather than to verify the status by obtaining the perceptions of all who are involved.

Three common elements of success can be learned from the European trip: (1) The importance of training the workforce can never be overstated; (2) The adaptation of international standards for ship design and manufacture (3) The commitment to CAD\CAM as the basis for extensive preplanning systems, allowing for facility and product planning to provide improved workflows and schedule execution.

The market definition transition for US Shipyards must be seen in a reorganization and redefinition of function inputs to the manufacture of ships versus shipbuilding. Drawings are based upon how to build a ship at your facility. Recent past and current markets for US shipyards have consisted of selling time, materials and space to the US DOD. In the future, US Shipyards must define and then transition themselves towards manufacturing and selling products that they can produce competitively at a well planned and revitalized facility. Organizations and facilities must change. Improving the capacity to analyze tasks and activities is therefore timely and will be of great value in defining and implementing a comprehensive strategic plan. Such a plan and the associated new organization could be established without costly and time consuming non-value added tasks.

The application of tools for overall continuous process improvement must become the usual way of doing business. Many other industries carry out these types of analyses and the associated formation of action teams to eliminate identified non-value added tasks. These applications become a part of that company's operating style. It becomes second nature to their management to identify and eliminate non-value added tasks.

The effectiveness of any program is how well its success is measured and perceived. We conclude that "Sacred Cows" cannot be allowed to exist.

Reporting must include both implemented and non-implemented activities. This would bring the actions of management towards "Sacred Cows" in clear focus. When these areas are eventually eliminated, the overall program will become unlimited. If on the other hand they are ignored, program effectiveness will be greatly reduced.

The successes seen during our European visits were all based upon the model 'A" shipyard analogy. (Executive Summary). {If Shipyard "A" has the proper business systems, work flows, space, and maximum crane tonnage to minimize lifts and maximize outfitting;.as well as ideal process layouts and equipment, Shipyard 'A" sets the standard. If shipyards "B", "C", and "D" only match up to the ideal yard in a variety of ways these non-ideal operations would be classified as having proportional non-value added elements.} The concepts of concurrent engineering, industrial engineering, work flow discipiine, and planning were all well applied. U.S. shipyards can easily utilize these European experiences for their strategic planning to become competitive in the global commercial maritime market. The lessons learned for transition were available from the Europeans we met with through their openness and sharing.

The market transition from sales of manhours, material, and operating expense to the DOD - to sales of commercial products that must be competitively designed, manufactured, and marketed, dictates an extensive redefinition of traditional shipbuilding concepts and a sweeping revitalization of existing shipyard operations. The application of industrial engineering tools for continuous process improvement must become entrenched as a new US shipbuilding discipline. Foreign competitors are leading the way in many aspects such as concurrent engineering, workflow discipline, automated storage and retrieval systems, and capitalization of their facilities. Yet the window of opportunity is still open for U.S. shipbuilders who dare to be progressive.

B. Recommendations

Fund an expanded overseas trip report based on this project, so that more of the knowledge gained can be communicated to this industry.

Establish and fund an industry wide Task Team on CDRL'S and Mil. Specs. To work directly with a government task team for mutual re--development.

Future projects utilizing these tools to upgrade and streamline specific shipyard functions and processes.

Future inclusion of these tools into all TQM programs and quality circles. Utilizing an outside facilitor for program initiation and monitoring its progress.

Future projects into all engineering functions. Including the immediate implementation of concurrent engineering programs.

Future projects applying industrial engineering tools and techniques to upgrade and streamline G&A functions.

To develop and conduct workshops on the application of industrial engineering tools and techniques to eliminate wasted efforts and resources.

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BIBLIOGRAPHY

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"An Approach for Improving White-Collar Productivity", Rodney A. Robinson, Visitor, Robinson-Page-McDonough and Associates, Inc.

"Reducing the Construction Contract Cycle for Naval Auxiliary Ships", Mark H. Spicknall, Associate Member, University of Michigan, Transportation Research Instiiute, and Michael Wade, Associate Member, Carderock Division - Naval Surface Warfare Center.

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APPENDICES

APPENDIX P

APPENDIX P

TABLE OF CONTENTS

IDENTIFICATION OF NON-VALUE ADDED TASKS

PROJECT OBJECTIVES

- Participation by Various Shipyards Private and Public
- To Develop and Define Methodologies to Identify and Categorize Non-ValueAdded Activities /Tasks
- To Develop and Define Methodologies to Eliminate those Activities/Tasks
- To Solicit and Define Related Activities/Tasks for Overseas Analysis
- To Review and Report Findings and Provide a "How To Methodology for Activity / Task Analysis"

BMS & ASSOC. 8-91-1

P-1

IDENTIFICATION OF NON-VALUE ADDED TASKS
VALUE LEVEL DEFINITIONS

VALUE LEVELS:

VLI = Part of the Process+ Value Added to Final Product

VL2 = Not part of the Process+ Value Added to Final Product

VL3 = Part of the Process+ No Value Added to Final Product

VL4 = Not part of the Process+ No Value Added to Final Product

ATTRIBUTES;

N = Necessary U = Unnecessary

1- Out of Sequence
2- Facility/Design Constraint
3- Quality/Industry Standard Requirement
4- Government Regulation Environmental
5- Government Regulation Other

BMS & ASSOC. NSRP 8-91-1

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IDENTIFICATION OF NON-VALUE ADDED TASKS
SP-8 PROJECT N8-91-1

SHIPYARD ANALYSIS PLAN

I. Initial Communication to Shipyard.

- A. Letter of Request to Conduct Analysis From BMS & Assoc.
- B. Letter of Introduction From - DTRC - NSRP Program Manager.
- C. Shipyard Analysis Plan
- D Shipyard Assigns point of Contact.

II. Preplanning - Point of contact and BMS & Assoc.

- A. Set up Contact.
- B. Begin Security and Badge activity.
- C. Plan For on Site Pre Planning. (To be deterrninedfor each shipyard. Based upon convenient concurrent travel by BMS & Assoc.)
- D. Data availability analysis.
- E. Initial Briefing attendance planning.
- F. Selection of specific ongoing areas for analysis.
- G. Preliminary analysis schedule development.

III. On Site Analysis (I-3 weeks)

- A. Briefing to Shipyard Management. (30-45 minutes)
- B. Interviews with Shipyard Management.
- C. Ongoing Analysis Areas Activities (Same tasks could be generated from Shipyard Management Activity.)
  1. Briefings
  2. Interviews
  3. Data Collection
  4. Analysis
  5. Results analysis and verification.

IV. Summary

- A. Listing Verification
- B. Debriefing
- C. Summary Activity Report Approved by Shipyard.

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DATA TASK ANALYSIS

"A" General Activities

"B" Material Handling - Product

"C" Set-Up/Tear Down

"D" Non-Applicable for this analysis

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AREAS OF OPPORTUNITY DIRECT FUNCTIONS
'IDENTIFICATION OF NON-VALUE ADDED TASKS.."

AREA

- Time. Keeping
- Training
- Absenteeism
- Communications
- Maintenance Support
- Tool Control
- Build Strategy Input
- Management Support
- More Business For Shipyards
- Environmental Laws
- Repair Preplanning and Initial Docking Procedures

BMS & ASSOC. NSRP N8-91-1

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IDENTIFICATION OF NON-VALUE ADDED TASKS IN SHIPBUILDING

INDUSTRIAL ENGINEERING ANALYSIS
BASIC CRITERIA

- Can these tasks /activities be eliminated?
- Can these tasks /activities be combined?
- Can the frequency of performing these tasks/activities be reduced?
- Can these tasks /activities be changed? Can they be improved?
- Can these tasks /activities be simplified?

BMS & ASSOC. 8-91-1

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POTENTIAL STUDY AREAS

I. Outfitting

- A. On Board
- B. Modular
- C. Overall Outfitting Planning

II. Production Support Services

- A. Docking / Undocking - Etc.
- B. Assembly Support
  1. On Board
  2. Modular -(Keel to Units)
  3. Flow Line - (Process Lines/Lanes)
  4. Shops
  5. Planning/Scheduling

III. Regulatory Cost Break-Out Reporting Requirements

- A. Local Regulations
- B. Environmental
- C. Customer Reporting
- D. Industry & Quality Standards

IV. Engineering / Support Areas

- A. Work Breakdown Structure of Activities
- B. Change Orders
- C. Master Scheduling

Avondale pilot Selection
12-16-91

The following is a summary of the selection/brainstorming meeting with Avondale staff. Upon review of the "Potential Study Areas", II. Production Support Services was selected as the focus for selecting detailed pilot study areas.

We defined these as being prorated direct charges to the job. Thus, the budgets for these activities would be generated by a historical calculation or estimate.

We began by generating a list of all the activities. Shown as Attachment "A" General Activities. Wtihin this list we called out if these were discrete or by craft.

We then sorted this list into three lists for a more specific selection analysis. The categories and lists were then "B" Material 'Handling - Product, "C" Set-Up/Tear Down, "D

Non-Applicable (For This Selection Analysis).

From List "B" Material Handling - Product, the following two activities were selected for the Avondale Pilot.

* Craft Material Expediter - By Craft

* Temporary Lugs and Bracing install and remove.

From List "C" Set-Up/Tear Down, the following two activities were selected for the Avondale Pilot.

* The S/T of Scaffolding
  Temporary Power
  Temporary Lighting
  Temporary Ventilation

* Set Up of Pin Jigs - Select specific
  S/T Fixed Jig movement, leveling,etc..,

The pilot is scheduled for early Februay 1992 at Avondale. The study results are planned to be complete by 3-1-92.

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BMS 1-2-92

Attachment "A"

General Activities Listing

Activity	Discrete/Craft	Notes
Layout	C	Accuracy Control
Carpenter-scaffolds S/T	D	
Temporary Electrical	D	
Pulling Welding leads	C	At platen, S/T
Temporary Lighting	D	
Temporary Ventilation	D	
Crane Operator	D	
Chip/Grind/Scaling	C	Hrs as required
Clean Up (CDC)	D/C	On Going
Fire Watch	D/C	
Rigging M.H.	D	Material at module
Time Keeping-Supervisor	C	Goes to Time Keeping (Good Potential has Heavy Political type roadblocks)
Dry Search	C	Craft Inspection
Craft Material Expediter	C	In Field, motorbike, communications
equipment.		

	Discrete/Craft	Notes
Preventive Maintenance of Ships Installed Equipment vendom	D/c/	PM, Calibration per instructions during construction.
Material Handling -At Work Center -Pallet to installation -Rolling stock	C	
Accuracy Control	D	
Field Clerical	C	
Field gang box control	C	
Paint Masking UnMasking	D/C	
Setting Pin Jigs	D/C	Shipfitting
Repair Fixed Jigs	D/C	Shipfitting
Fixture Jigs Setup/ Tear Down	D/C	Shipfitting
Tacking of Temp. Bracing		
Temporary Lugs		M.H.
Temporaty structures		Shipfitting

Attachment "B"

Material Handling - Product

Crane Operator

In Cab Certified

Pendant Control

Material/Module Handler

* **Craft Material Expediter -by craft**

Material handling on site-pallet to unit

Rolling stock operators

• **Temporary Lugs and Bracing install and remove.**

Bold = Pilot Selection

Attachment "C"

Set up/Tear Down (S/T)

* Set Up And Tear Down

  Scaffolding

  Temporary Power

  Temporary Lighting

  Temporary Ventilation

  S/T Pull Weld Leads

  S/T Pull Cutting Hoses

  Field gang boxeslwelding power supplies/central

* **Set up Pin Jigs (select** specific)

• **Set up and Tear Down**

  fixed jig movements, leveling, ete.

Bold = Selected for Avondale Pilot

Attachment "D"

Non-Applicable (For this Selection Anal!ysis

Layout

Accuracy Control

Chip/Grind/Scale

CDC

Fire Watch

Time Keeping

Dry Search

P/M

Field Clerical

Paint Mask/Unmask

Repair Fixed Jigs

Tacking of Temporary Bracing

CUSTOMER REPORTING ANALYSIS
'IDENTIFICATION OF NON-VALUE ADDED TASKS.."

Total # -327	CDRL'S	
Level of Effort	% Group	% cost Group
I Data Not Essential Not Utilized By Contractor		
II Essential Data Not Utilized By Contractor, Requires Minor Modifications		
III Data Developed By Contractor for Own Use. No Modification		
Iv Data Developed By Contractor w/ Little Modification		

NSRP N8-91-1 BMS & Assoc.

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TASKS FOR OVERSEAS ANALYSIS

'IDENTIFICATION OF NON-VALUE ADDED TASKS.."

- Time Keeping
- Maintenance and Capital Facility Expenditures Last 25 Years in 5 Year Increments
- Build Strategy and Planning Initiatives Last 25 Years
- Constraints of Environmental Laws
- Methods for Production Inputs to Overall Strategy and Specifically to Build Strategy
- ,Training Budgets Historically and Planned
- Absenteeism /Welfare Ovewiew
- International Standards Utilized
- Customer Reporting
- Change Control
- Repair Preplanning and Initial Docking Procedures
- Staffing Discipline Flexibility Analysis

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IDENTIFICATION OF NON-VALUE ADDED TASKS
TYPE OF SHIPYARD PARTICIPATION

- **Pilot Program - Avondale February, 1992**
  - Verification
- **Area Analysis - Area SY Area, SY**

March, 1992- July 1992

Verification	Verification
SY____,	SY____,
SY____,	SY____,
SY____,	SY____,

- **Review and Summary of Area Analysis Studies**
- **Selection of Specific Areas for Overseas Analysis**
- **Final Analysis and Reviews for a Final Project Report**

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The Importance of Identifying Cost Drivers

Most cost accounting systems are oriented toward work orders and do not identify adequately the impact of cost drivers on the cost of individual manufacturing processes. Today, the direct-labor orientation of most manufacturing managers results in the attitude that responsibility and organizational structure are one and the same. However, many costs incurred in one department are caused by decisions made in other departments.

Many strategic planners believe that the best way to control costs is to monitor and control cost drivers. Examples of cost drivers, as developed by Arthur Andersen & Company in the Accounting Futures Study, include engineering change orders, space utilization, forecast errors, master scheduling changes, inventory levels, product design and lack of interchangeable components, and multiple bills of material.

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Activities can be decomposed into tasks, sub-tasks, and operations. Tasks are the work elements of an activity. The relation between functions, activities, and tasks can be described as follows:

Function	Perform manufacturing
Activity	Machine small parts for sheet-metal center
Task	Drill holes
Information element	Work order Process plan • • • Part number

Although there are hierarchical relations between functions, activities, and tasks, the term activity will be used in a general sense to stand for all of them. The function level is often too global to provide accurate traceability, and tasks are often too small (localized) a detail for control. For this reason, activities in the CMS Functional Model were chosen to document the operations of the organization.

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Identify costs of non-value-added activities to improve use of resources. The cost of non-value-added production and support activities should be identified to provide the visibility and basis for their reduction and elimination.

Recognize holding costs as a non-value-added activity traceable directly a product Holding assets represents an important non-value-added cost. These assets must refinanced through internal cash or external debt and equity. The cost associated with holding assets has traditionally been buried in overhead or ignored on financial reports. This cost can be calculated as an imputed cost for management reporting purposes.

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DEFINITION OF A 'NON-VALUE ADDED" TASK

Lead time = Process time+ Inspection time+ Move time+ Wait time

Lead time = Process time+ Non-value-added time

$$MCE = \frac{\text{Processing time}}{\text{Processing time + Inspection time + Wait time+ Move time}}.$$

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Target Cost

Target cost represents a market-based cost that is calculated using a sales price necessary to capture a predetermined market share. In competitive industries a unit sales price would be established independent of the initial product cost. If the target cost is below the initial forecast of product cost, the company must drive the unit cost down over a designated period to compete.

Target cost = Sales price (for the target market share) - Desired profit

If the target cost is initially lower than the budgeted or standard costs, cost reductions would be factored into the budget and standards over a period of time. Cost reduction can be achieved in two ways: (1) A learning curve occurs during early production volumes as a process is being refined. (2) The company applies a philosophy of continual improvement in eliminating waste.

To implement the target cost concept, a company may want to develop more detailed measurement systems for activity-level costs and performance. Such systems would help identify progress in meeting the overall target cost objectives.

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SAMPLE ACTIVITY LISTING

Activity #	Activity Description	Driver	# of Depts	Cost
1030	BUILD FINAL ASSEMBLIES	# OIL'S	4	$24.0M
1029	BUILD SUB-ASSEMBUES	# OIL'S	4	7.4M
1008	MOVE A/C COMPONENTS TO THE ASSEMBLY AREA	# PART #'S	1	3.2M
1009	FABRICATE TOOLS	# T/O'S	2	3.0M
1067	REWORK/REPAIR	# QAR'S	8	2.7M
1004	INSPECT FINAL ASSEMBLIES	# INSP PTS	1	2.7M
1012	ALTER TOOLS	# ECN'S	1	2.1M
1016	PROVIDE lE/ME LIAISON SUPPORT TO ASSEMBLY	# QAR'S	4	2.0M
1001	ANALYZE AND DOCUMENT QAR'S	# QAR'S	4	2.0M
1059	DISPATCH ASSEMBLIES	# MOVES	1	1.8M
1018	PROVIDE REPORTS & CHARTS FOR ASSEMBLY PROCESS	# REQUESTS	7	1.5M
1066	DESIGN TOOLS	# T/O'S	1	1.3M
1028	GENERATE PLANNING FOR ECN ACTIVITY	# ECN'S	1	1.2M
1027	GENERATE & ISSUE lNSTALLATION LEVEL PLANNING	# ECN'S	1	1.0M
1003	INSPECT SUB-ASSEMBLIES	# INSP PTS	1	1.0M
1007	FIXTURE INSTALLATION& MAINTENANCE	# T/O'S	2	0.8M
1010	REPAIR TOOLS	# T/O'S	2	0.6M
Io06	MOVE TOOL MATERIAL & SUPPLIES	# T/O'S	2	0.6M
1017	INITIATE & SUPERVISE PROCESS IMPROVEMENTS	# QAR'S	2	0.5M
1002	LINE PAINTING	# PARTS	1	0.5M
XXXX	ALL OTHER	VARIETY	13	5.0M
	TOTAL			$64.9M

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Sample Report

Dept	Activity #	Activity Description	Driver Description	Driver	Annual Cost (,000)	Value Added	Nec.	Outsrc.
315-0	1001	Analyze and Document QAR's	# of QAR's	10,524	$ 476	No	Yes	No
241-3	1017	Supervise Process Improvements	# of QAR's	1,916	$ 249	Yes	N/A	No
384-0	1018	Provide Charts & Reports	# of Mgt Requests	TBD	$ 183	No	No	No
495-0	1023	Support Eng. Change Activity	# of ECN's	TBD	$ 369	Yes	N/A	No

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APPENDIX C

APPENDIX C

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DEPARTMENT OF THE NAVY
DAVID TAYLOR RESEARCH CENTER

ANNAPOLIS LABORATORY
ANNAPOLIS, MD 21402-5067

CARDEROCK LABORATORY
BETHESDA, MD 20084-5000

IN REPLY REFER TO:

1253:DPR:eff
21 Aug 91

TO: **SHIPYARD EXECUTIVE MANAGEMENT AND ADMINISTRATIVE STAFF**

This letter serves to introduce you to Mr. Barry Schram, BMS & Associates of La Jolla, California. BMS & Associates has been selected to serve as the contractor on a National Shipbuilding Research Program (NSRP), Ship Production Committee Panel SP-8 Project N8-91-1, "Identification of Non-Value Added Tasks". Mr. Schram will serve as the Project Manager and is now selecting and will be contacting shipyards individually for participation with this research. The project budget and schedules would require your help in obtaining timely access and security badge processing for Mr. Schram as a contractor at each facility.

This NSRP project deals with the total shipyard as an entity. The potential benefits available with the identification of non-value added tasks and their elimination are seen to be substantial. These would result in direct cost reductions, improved levels of competitiveness, and would be reflected positively. This research is to define and refine a methodology for "The Identification of Non-Value Added Tasks" in the U.S. Shipbuilding and Repair Industry. It would require a shipyard management level briefing and debriefing. The debriefing could secure, as required, the level and content of any release of any related or discovered data or analysis which might be of concern to the participant. The nature of this research would require access to the historical or actual data (or formats), such as business plans, charts of accounts, selected financial and contract data, as well as engineering and operating planning and reporting.

The NSRP Program is defined by its research panels. This project is for Panel SP-8, Industrial Engineering. David Taylor Research Center (DTRC) has selected three shipyards and one university to represent the industry as principal sponsors of the NSRP Program. Newport News Shipbuilding, Newport News, Virginia was chosen to be responsible for work in the area of Ship Design and Engineering Process. Mr. William Becker of Newport News Shipbuilding is the Program Manager for SPC Panels SP-4, 6 and 8. BMS and Associates has been contracted by Newport News Shipbuilding to perform this task.

I wish to encourage your participation with this NSRP Project; we feel it can help you directly in a timely manner.

Dale P. Rome

Dale P. Rome
NSRP Program Manager

DEPARTMENT OF THE NAVY
CHARLESTON NAVAL SHIPYARD
CHARLESTON, S.C. 29408-6100

21 October 1991

Mr. Barry M. Schram
BMS and Associates
P. O. Box 2863
La Jolla, CA 92038

Dear Mr. Schram:

This is in response to your ietter of September 17, 1991 tome concerning your company's project to identify Non-Value Added Tasks at naval shipbuilding and repair facilities.

From my review of the descriptions of the project provided by both yourself and Mr. Rome, this would appear to be a meaningful and useful study which has the potential to be of great benefit to the Government.

As you maybe aware, however, the Charleston Naval Shipyard (CNSY) is presently undergoing a reorganization, restructuring and reduction in force which must be completed before the commencement of your study. As a result, we are nearing the conclusion of an Activity Based Costing study, using the services of a consulting firm, leading to immediate and near term actions as noted above. Our goal in the present study is, in part, to streamline our operation across the board by identifying, analyzing and deleting those tasks which are non-value added.

I believe a broader study such as you have proposed will have potential value for the shipbuilding and ship repair community as I have noted above, but I do not believe that the inclusion of CNSY in your study would provide the near term solutions we require.

I have taken the liberty of passing your letter and that of Mr. Rome, together with this response, to Naval Sea Systems Command in the interest of providing the widest possible dissemination of the information you have provided regarding your study.

Sincerely,

T. J.' PORTER
Captain, USN
Commander, Charleston Naval Shipyard

copy to:
Dale Rome
NAVSEA 07

management services
b m associates
barry m. schram &
bms & assoc.

September 17, 1991

Mr. Edmund Mortimer
Yard Manager
Avondale Shipyard Division
P.O. Box 52080 MIS 91
New Orieans, LA 70150-0280

Subject: Request to have Avondale Shipyard as a participant in the research for the NSRP Task N8-91-1 Identification of value added Tasks

Reference: Letter from NSRP Program Manager, Dale Rome, 21 Aug 91. (Attached)

Dear Sir;

BMS & Associates wishes to have the participation of you and your designated staff on this NSRP Research Project. Knowingly, the Curtis Bay Shipyard is involved with critical budget planning activity, and is faced with the need for established rationale for all expenditures.. With the identification of non-value added tasks and their elimination, the potential benefits of this project could be substantial.

This research would look at past and current related programs and activities as well as its own investigative analysis to develop a listing and quantification of these tasks. The results could be reflected directly in cost reductions and improved levels of competitiveness. The purpose of this research is to define and refine for continued application a methodology for 'Identification of Non-ValueAddedTasks in Shipbuilding and Repair.

We request that once you agree to participate, you designate a point of contact from your facility. We have copied Ursula Yeo, whom we know from our past NSRP SP-8 activity. Attached is a Shipyard Analysis Plan, which initially proposes our requirements and approach to the research. As Mr. Rome's letter indicates, this project would require a shipyard management level briefing and debriefing. The project's schedules and budgets are restricted, thus the assistance from the point of contact as to security and pre-planning could optimize each paties' efforts. We began our pre-planning in September, with site analysis beginning in October through April 1992.

P.O. Box 2863 - La Jolla, CA 92038 (619) 552-1413 FAX (619) 452-1814

We lookforward to your participation and the obtaining of some very substantial savings. Please have your point of contact get in touch with me as soon as possible.

Thank you in advance for your cooperation.

Yours Truly,

Barry M. Schram
BMS&Assoc.

Attachments

management services
b m associates
barry m. schram &
bms & assoc.

September 14, 1992

Mr. Joachim Brodda
Dipl. Lng.(TU)
Bremer Vulkan AG
Schiffbau UNd Maschinenfabrik
Lindenstr,
110 Postfach 75 02 61
D-2820 Bremen 70

Dear Joachim,

Subject: Request for visit to the Bremer Vulkan, as part of NSRP Task N8-91-1 **"Identification of Non-Value Added Tasks..."**

Reference: Letter From NSRP Program Manager, Dale Rome, 21 Aug 91.(Attached)

As discussed BMS & Associates wishes to have the participation of you and your designated staff at Bremer Vulkan, on this NSRP Research Project. I will be in Europe, visiting with various organizations and their facilities, from October 6 through 15 of this Year. We wish to visit with You as discussed on either Monday October 12 or Tuesday October 13, 1992. Your help in coordination would be greatly appreciated knowing that you will not be at your facility during my trip.

The attachments included should allow for a overview of what the focus of my project is. This should help us to plan some informative meetings during our visit. These include:

* Introductory Letter From The NSRP Program Manager - An Overview of the NSRP and Panel SP-8 Industrial Engineering.
* Project Objectives Chart
* Tasks For Overseas Analysis Chart

I plan to travel on October 11, arrive in Bremen on October 11, stay in Bremen the evenings of the llth and 12th, then travel to Hamburg on the evening of the 13th. You had offered to supply me information or help me with obtaining reasonable hotel accommendations, such would be greatly appreciated.

Please review this request and plan and advise via fax as soon as possible. We look forward to our visit. Again, I thank You for your help in coordinating this visit.

Yours Truly,

Barry M. Schram

P.O.BOX2863.La Jolla,CA92038 (619)552-1413 FAX(619)452-1814

APPENDIX S

APPENDIX S

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"IDENTIFICATION OF NON-VALUE ADDED TASKS..."

EUROPEAN SHIPYARD COMMUNITY TOUR AND VISIT

SITE DATA COLLECTION

BARRY M. SCHRAM

BMS & ASSOC.

DATE. OCTOBER 1992

SHIPYARD:

CONTACT:

A/F = **Attached/Follow+p**

1. **Shipyard / Facility Overview. _A/F**

II. **Type of Ownership**

III. Organization **Type _A/F**

Staffing Breakdown:

G&A:
Eng. **R&D** **Prod.** **Design:**
Direct Labor:

Apprentice Programs:

Iv. **Training Overview**

TASKS FOR OVERSEAS ANALYSIS

I. Time Keeping ____ A/F

II. Maintenance and Capital Facilities Expenditures Last 25 Years in 5 Year Increments BMS Format, AIF

III. Build Strategy and Planning Initiatives over the Last 25 Years BMS ____A/F

IV. Constraints of Environmental Laws _____ A/F

V. Methods for Production Inputs to Overall Strategy and Specifically to Build Strategy ____A/F

VI. Training Budgets Historically and Planned A/F

VII. Absenteeism /Welfare Overview A/F

VIII. International Standards Utilized A/F

Ix. Customer Reporting A / F

x. Change Control _____A/F

XI. Repair Preplanning and Initial Docking Procedures _A/F

XII. Staffing Discipline Flexibility Analysis _____A/F

XIII. Industrial Engineering's Role A/F

XIV. Ongoing Quality, Teamwork, or Concurrent Engineering Programs A/F

XV. Overview of Computer Application to Direct Production _ A / F

XV1. Production Process Overviews

A. Crane _____ A/F Tonnage

B. **Material Handling A/F**

C. **Material Control ____ A/F**

D. **W e l d i n g A/F**

E. **Surface Preparation and Coating A / F**

Pre Construction primer Status _ A/F

Environmental/Containments Status _____A/F

F. **Other _____ A / F**

G. Other _____ A / F

H. **Other_____ A / F**

XVII. Industry Cooperation Overview A / F

A. Sharing of data etc. A / F

B. Out Sourcing ____A/F

C. Other ____A/F

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Facilities / Site Maintenance Overview

(This overview is from the Project Reference File, currently it acts only as drafted notes on this project.)

Objective:

To objectively gather historical data as to budgeting and staffing in US Shipbuilding of Facilities Capital Improvements and Maintenance budgeting and procedures. All the above relating to a shipyards overall business, relative to the past twenty-five years.

Background:

Traditionally the long term planning for any industry to define its competitive position must be dependent upon its strategic capital plan, as they relate to facilities and markets. Shipbuilding competitiveness does fall into this definition. A good indication of the long term future as well as the causes for current high costs and cycle times can be seen directly from an analysis of ones strategic capital commitments over time to facilities.

Those whom have planned and invested consistently in their facilities, are part of the future. Those whom have not invested in their facilities, already are gone from the industry. Those with partial facility investment efforts are survivors at the critical edge.

For many years foreign Shipyards have been subsidized directly in this area. Thus foreign shipyards now have 100% of the international commercial market. The US Shipyard population has been continuously decreasing the last twenty five years. The other effects of this lack of strategic capital investment in facilities, has been a decrease in capacity, as well as not having the latest technologies introduced into ones facility. These conditions are most often reflected in having to perform extra tasks to do the same job, then those whom have made capital facility investments. In shipbuilding and repair it is most clearly shown by the crane tonnage capacity which allow for a greater capacity in module assembly and many less costly crane lifts at later stages of ship production.

Directly related to strategic capital facility spending, are the maintenance procedures required to maintain even those undercapitalized facilities and its required support subsystems. Thus the budgets and procedures to maintain a shipyard facility and its support systems is again most critical. The same spending analysis for maintaining a shipyard and its support systems overtime,

will identify those who are competing, those who have departed, and those whom are surviving and perhaps for how long.

The procedures required to keep a facility and its support systems from a negative impact on ones business must be a high priority of the management. When these procedures and budgets are compromised the number of non-value added maintenance or support systems delays are continuously growing and having a consistent negative impact on cost and schedule performance. Such compromises can often be characterized as being "Penny wise and Dollar poor...".

Data Collection

The attached survey will be sent to various shipyards, public and private. We want general statistics, and or comments. Hopefully this information can be easily extracted from previously submitted internal or external data. Please return with data or comments. The sources for this data could be some of the input previously utilized for internal budgets and submissions to surveys' such as the MARAD Form 17. The accuracy is not essential as is the trend which does exist.

Application:

The data and comments will be utilized to identify and classify those non-value added tasks caused directly by these factors Capital Facilities Spending, Maintenance Procedures and Budgets.

Potential Benefits:

This data and its application and analysis in this project could be utilized perhaps to show our government where some specific capital facility investments by shipyards could be treated more favorably, to secure and increase jobs in this basic industry. The same applies to maintenance costs related to maintaining the shipyard facility and support sub-systems any government policies producing a favorable work environment, would also aid in jobs and market share.

Survey: maintenance of Shipyard Facilities and Support Sub-systems
For the Past Twenty-five Years.

Time Period:	**% of Total Budget to Operations + or -**	**% Business Growth + or -**	**Staff Level % + or -**
1.			

Facility or Support Sub-System:

General Comments:

Time Period:	**% of Total Budget to Facility + or -**	**% Business Growth + or -**	**Staff Level % + or -**
2.			

Facility or Support Sub-system:

General Comments:

Time Period:	% of Total Budget to Operations + or -	% Business Growth +or -	Staff Level % + or -
3.			

Facility or Support Sub-System:

General Comments:

Time Period:	% of Total Budget to Operations + or -	% Business Growth + or -	Staff Level % + or -
4.			

Facility or Support Sub-system:

General Comments

Time Period:	% of Total Budget to Operations + or -	% Business Growth + or -	Staff Level % + or -
5.			

Facility or Support Sub-system:

General Comments:

Survey : Facilities Capital Investments
For the Past Twenty-Five Years

Instructions Please breakdown your input into at least two periods of time. We do not request a great deal of detail just some general trends. Where possible specify spending to specifics.

Time Period:	% of Total Budget to Facility + or -	% Business Growth + or -	Comments
1._____	_____	_____	_____
_____	_____	_____	_____

Specific Areas_____

_____

_____

General Comments:_____

_____

_____

Time Period:	% of Total Budget to Facility + or -	% Business Growth + or -	Comments
2._____	_____	_____	_____
_____	_____	_____	_____

Specific Areas:_____

_____

_____

General Comments:_____

_____

_____

Time Period:	% of Total Budget to Facility + or -	% Business Growth + or -	Comments
3.			

Specific Areas

General Comments

Time Period:	% of Total Budget to Facility + or -	% Business Growth + or -	Comments
4.			

Specific Areas:

General Comments:

Time Period:	% of Total Budget to Facility + or -	% Business Growth + or -	Comments
5.			

Specific Areas:

General Comments:

APPENDIX M

APPENDIX M

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ACTIVITY ANALYSIS

COMPANY:

PRES (V.P.) OPRTNS, G.M., **MANAGER** _____

SHIPYARD: _____

_____

_____

TELEPHONE _____

DATE _____

STAFF ANALYST/ENGR; _____

DEPARTMENT NAME/ZONE/COST ***CENTER*** _____

GENERAL DEPARTMENT INFORMATION

1. DEPT. MANAGER _____ Telephone _____

2. SUPERVISOR _____ Telephone _____ Shift _

SUPERVISOR _____ Telephone _____ Shift _

SUPERVISOR _____ Telephone _____ Shift —

3. LEADS/PRODUCTION COORDINATORS/SST.. ASSEMBLERS (Attached Organizational Detail r)

_____ Shift 1 ____ 2 ____ 3 ____

_____ Shift l — 2 — 3 —

_____ Shift I — 2 — 3 —

_____ Shift 1 ____ 2 ____ 3 ____

4. HOURS OF OPERATIONS

1st shift: _____ a.m. to _____ p.m. Lunch: _____ Break — a.m. _____ p.m

1st shift: _____ a.m. to _____ p.m. Lunch: _____ Break — a.m. _____ p.m

1st shift: _____ a.m. to _____ p.m. Lunch: _____ Break — a.m. _____ p.m

5. Describe policies of shift rotation: _____

6. Describe policies on OVertime: _____

7. Describe vacation, holiday Poiicies: _____

8. Describe absenteeism policies: _____

9. Describe department function and responsibility: _____

10. Are there clean up/wash up allowances? _____

11. What departments are interfaced with? Why? Frequency? _____

Can you provide an illustration? Yes — N o —

12. Methods used in communication between departments? _____

13. Changes planned for the future; _____

14. Job classifications: _____

Number of employees: _____
(See Accounting, Human Resources).

15. Seniority level: _____ Attrition rates: —,

Turn over: _____ Terminations: _____

16.List major machinery and equipment _____

17. Stationfill positions _____ Shift _____

_____ Shiftt _____

_____ Shift _____

_____ Shift _____

18. Organization chart

19. Department layout: (see addendum mcs l).

20. Depsrtment work flow: (See addendum mcs ll).

21. Control documents; (see addendum mcs lll).

22. Are there peak periods/volumes/demands? _____

23 List operating problem _____

A How many employees present today? _____

B How do you know there are enough people to get the work accomplished? _____

C. Are you going to make schedule/plan today? _____

D Who are your good producers? _____

E. How do you determine what work is to be performed? _____

Supervisor expectatopms:

Sr. Mgmt.:

What level supervisory training or management development exists?

Frequency

MANAGEMENT CONTROL SYSTEMS

PIANNING

iS there a production schedule? _____ **Who prepares it?** _____

How often is it reviewed? _____ **Are there many changes daily/Weekly?** _____

_____ **Are there priority lists?** _____ **Shortage lists?** _____

_____ **Backlog Controls?** _____ **Are there standards?** _____

How were standards established? (Historical/time clock/gut feel)? _____

_____

How old are standards? _____ **How accurate?** _____

ASSIGNING.

How are assignments made? (verbal/written/lists) _____

Are standards used in assigning? _____

Assignments made daily? Weekly? _____

Whose responsibility is **assigning the work?** _____

_____

MONITORING / EXECUTION / FEEDBACK:

What means are used in checking the *productbn* **status?** _____

_____

_____

_____

What means are used in checking problems incurred? _____

_____

_____

_____

REPORTING / FOLLOW-UP:

How is **production data transmitted?** _____

_____

How does it tle back to assignments and plannlng? _____

Are standards used in deriving performance? _____

Are the employees total of the production status? _____

How?

EVALUATION:

Do you have a daily operation review accounting for the schedule variances?

Do the backlog controls determine manhours required for completion?

Are standards used in evaluating performance?

QUALITY CONTROL SYSTEMS

RESPONSIBILITY;

- SYSTEMS / STATISTICAL DATA/MEASUREMENT TOOL:

(SOURCE)

MONITORING

REPORTING / FEEDBACK

EVALUATING

Current / Past scrap rate;: _____ **Rework %?** _____

Failure Rate? _____ Amount return from customer? _____

_____ DOA material%? _____

current problems; _____

Quality circles? _____ **Departments** involved _____

Chairperson: _____

Facilitator. _____

ACTIVITY/TASK ANALYSIS

A/T. 1. **Do you** have at liting of the activities or tasks for **your group? Please list and attach.**

Title	Source	Use	Availability

A/T_2. Have these Activities\Tasks been recently reviewed by you or anyone else?

By	When	Why	Data Status

A/T-3. Have you reviewed these Value Level definitions?

Yes _ No _

Can you try to give an example of each type from your group?

VLI _____

_____

VL2 _____

_____

VL3 _____

_____

VL4 _____

_____

Please list and try to describe any attributes.

Attributes: _____

A/T-4. Can you express briefly, functional and cross-functional relationships for this project?

Functibnal: _____

Cross Functional: _____

A/T_ 5. Are there any industry reference sources or documents available that help you with your Activity/Task Definitions?

Yes _ N o _ Discussion _

Title	Source	Use

A/T_6. Please describe of attach those activities involved with timecards.

Time Cards: _____

A/T_7. Please list by activity and task those departments or groups you must interface with. (As how)they relate to what you do.)

#_- Department/Group _____

Activity/Ta k: _____

(Attachment

Method of Control: _____

(Schedule, Work Request, etc..)

Relationship to you:

DOES the task _ set-up/Tear-down _

Service _ support _

Plan/Schedule _ Record Keeping _

Other _____ Other_____

#_ Department/Group _____

Activity/Task: _____

_____

(Attachments -_)

Method of Control; _____

_____

(Schedule, Work Request, etc..)

Relationship to you:

DOES the task_ set-up/Tear-down _

Service _ Support _

Plan/Schedule _ Record Keeping_

Other _____ Other_____

MATERIAL

M -1. Is material procurement a problem area?

M_2. Is there any effort as to 'Least Installed Cost Ideas"?

M_ 3. Do you have examples where different material costs would lower production costs?

M _4. Is material available when needed?

M-5. Do you ever have to work around missing items?

Give some common examples

M_ 6. Do you feel that any material problems stem directly from engineering?

Problem	Source	Reference	Frequency

M-7. Material Planning:

A. What is used as your material schedule?

_____

_____

_____

_____

(Attachments

B. Do you have a planner/expediter?

1. In your group?
2. Assigned to you and other groups?_
3. Other? _____

C. How do feel this setup works and how may it be improved?

_____

_____

_____

_____

D. Do you have computer access for material?

1. In your offices, dedicated to your group?_
2. In a shared office: Dedicated _ Shared_
3. None _ Other _____

_____

M- 8. Is there a "Materials Hot Sheet" by:

Type	Yes	No	Frequency Monthly	Weekly	Daily
Project	___	___	___	___	___
Department	___	___	___	___	___
Group/craft	___	___	___	___	___
Other	___	___	___	___	___

M_ 9. Are there Material Planning Meetings?

Type	Yes	No	Frequency Monthly	Weekly	Daily
Project	—	—	—	—	—
Department	—	—	—	—	—
Group/Craft	—	—	—	—	—
other	—	—	—	—	—

M_ IO. Please List your five most common material problems?

Problem #_

Description _____

_____

_____

Activity/Task: _____

_____

_____

Problem #_

Description: _____

_____

_____

Activity/Task: _____

_____

_____

Problem #_

Description _____

_____

_____

Activity/Task: _____

_____

_____

Problem #_

Description _____

_____

_____

Activity/Task _____

_____

_____

Problem #_

Des _____

_____

_____

Activity/Task _____

_____

_____

M_ II. **What changes would help your material planning and delivery problems?**

Change #_

Description: _____

_____

_____

Activity/Task _____

_____

Was this change ever documented? Yes-_ No —

When? _____ **How?** _____ **Attached** _

Change #_

Description: _____

_____

_____

Activity/Task: _____

_____

Was this change ever documented? Yes_ No _

When? _____ How? _____ Attached _

Change #_

Description: _____

_____

_____

Activity/Task: _____

_____

Was this change ever documented? Yes _ No_

when? _____ How? _____ Attached _

Change #_

Description: _____

_____

_____

Activity/Task _____

_____

Was this change ever documented? Yes _ No_

When? _____ How? _____ Attached _

M 1-5Appendix A NSRP 0337 12/91

TRAINING

Activity/Task _____

_____

(Separate Sheet For Each Study Area)

Avondale Pilot= AP

Pilot Areas:

1. Croft Material Expediter
2. Temp. Lugs/bracing
3. Set-up/Tear Down
   - Temp. Power
   - Temp. Lighting
   - Temp. Ventilation
4. Set-up Pin Jigs, set-up/Tear Down
   - Fixed jigs, moves, etc.

Questions:

T-AP_I. What training is currently underway? _____

T-AP _2. How responsive and effective is the training Program? _____

T-AP -3. Can you get the training you need? _____

T-AP _4. What training would you like to have set-up? _____

T-AP _ 5. How do you go about getting it going? _____

T-AP _ 6. Do you have environmental training? (On environmental requirements and regulations) _____

T-AP _ 7. Can you identify environmental needs that exist now?

TAP- 8. Do you feel that any training improvement are needed with any of the groups you Interface with?

Group	Activity/Task	Type Training

T-AP -9. Can you estimate what your company spends on task specific type training?
(As a % of the *total* budget as well as a % of your budget)

_% Total _% Department _ F/U

What should this be?

_%4 Total _% Department

1-7 Appendix A NSRP 0337 12/91

SCHEDULES/WORKPLANNING

S/WP_1. **List the Schedules your group must follow. (Attach samples)**

TYPE	SOURCE I E	STATUS Y N	FREQUENCY M W D I=Issue S=Status

S/WP _ 2. **Which groups do you interface with for each above schedule?**

Group Name	Schedule Type								
	1	2	3	4	5	6	7	8	9

PROJECT PLAN

PROJECT TITLE	PROJECT NUMBER	DATE
ORGANIZATION(S) INVOLVED	TYPE OF PROJECT	PRIMARY CONTACT

OBJECTIVES[1]

SCOPE[2]

(use.additional sheets as required)

APPROACH[3]

PLANNED/ACTUAL ACTIVITY BY PHASE

	START DATE		COMPLETION DATE		MAN WEEKS		
PHASE	PLANNED	ACTUAL	PLANNED	ACTUAL	PLANNED	ACTUAL	REMARKS
PRELIM							
1							
2							
3							
4							
5							
6							
SPECIAL[4]							

TOTAL MAN WEEKS		PROJECT COST		ANALYST(S) ASSIGNED
ESTIMATED	ACTUAL	ESTIMATED	ACTUAL	

KEY: 1 - ENTER SPECIFIC OBJECTIVES OF PROJECT
2 - ENTER ORGANIZATIONAL COMPONENTS AND FUNCTIONS TO BE INCLUDED. INDICATE CONSTRAINTS IF ANY.
3 - ENTER SPECIAL APPROACHES TO BE EMPLOYED OTHER THAN ROUTINE PHASE REQUIREMENTS, SUCH AS SEQUENCE OF COMPONENT STUDY.
4 - USE IN UNPHASED PROJECTS.

M-2

LIST OF REPORTS PREPARED

ORGANIZATION			DATE	
FORMATOR FORMNUMBER	REPORT TITTLE	FREQUENCy SUBMITTED	PREPARED BY	REMARKS/REFERENCES

M-3

LIST OF FORMS

ORGANIZATION				DATE
FORM NUMBER	TITLE	NUMBER OF PARTS	ANNUAL USE	REFERECEDOCUMENTS/ USEDBY/REMARKS

M-4

TASK LIST

ORGANIZATION	DATE	PAGE
	PERSON(S)	

TASK NAME/SUMMARY			FORMNUMBER(S)	REFERENCE

M-5

TASK LIST

Organization	Person(s)Title(s)	D Page of		

Task No.	Task Name/Summary	Freq. performed	2 Quantity	3 Forms used	4 Hrs Per Week

KEY: 1 - Enter Frequency of Task Performance (Daily, etc.)
2 - Enter Number of Times Task Performed for Frequency Indicated
3 - Enter Identification Numbers for Forms used in Task
4 - Enter Hours spent on Task during Week

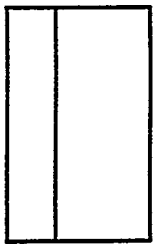
TOTAL

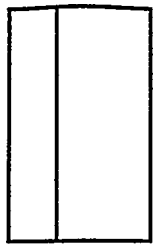
M-6

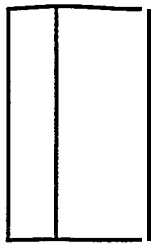
PROCESS/TOOLS/EQUIPMENT LISTING

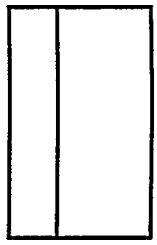
ORGANIZATION_____ DATE_____

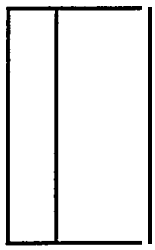
Nomenclature / Description	Number Authorized	Number On Hand	Leased Or Owned	Monthly Rental Or Depreciation	Purpose/Capacity Of Equipment	Used By	Est. Hours Used Per Week

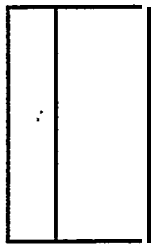


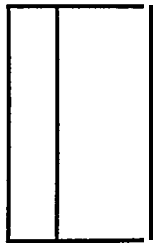


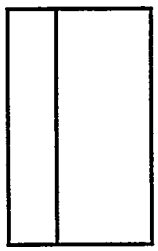


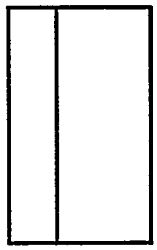


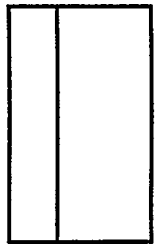


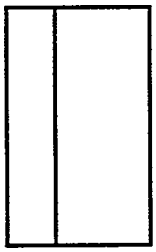


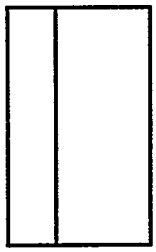


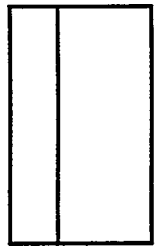


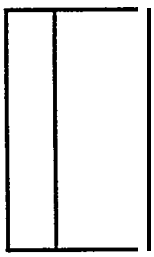


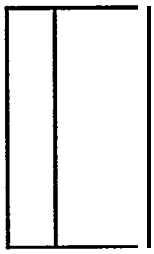


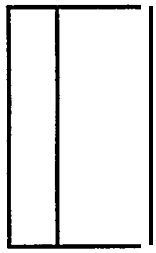


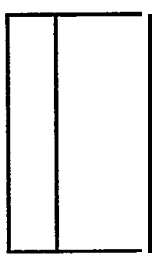


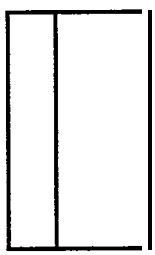












'IDENTIFICATION OF NON-VALUE ADDED TASKS IN SHIPBUILDING APPROACHSUMMARY

- Initial communication with top shipyard management
- Briefings and commitment from top shipyard management
- Project planning team selection
- Planning team project area selection
- Briefing to area management (cross functional)
- Project schedule development and functional area interviews
- initial analysis and follow-up interviews
- Selected functional analysis from interviews
- Selected methodologies to be applied
- Non-value added categorizations
- Analysis and elimination presentation planning
- Cross functional implementation planning
- Team summary of progress (periodically)
- Ongoing implementation, analysis, and expansion to other areas

BMS ASSOC. -91

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'IDENTIFICATION OF NON-VALUE ADDED TASKS IN SHIPBUILDING'
KEY ANALYSIS METHODOLOGIES RECOMMENDED

- ACTIVITY ANALYSIS (NSRP 8-1-91)
- REPORT ANALYSIS (NSRP 8-1-91)
- PROJECT APPROACH (NSRP 8-1-91)
- U.S. NAVY VALUE ENGINEERING (VE) APPLICATIONS AND CONTRACTUAL IMPLEMENTATIONS. (ANALYSIS AND TECHNOLOGY INC. 6-90)
- METHODS IMPROVEMENT WORKSHOP FOR THE SHIPBUILDING INDUSTRY. (SEPTEMBER 1990 NSRP 0328)

Bus & Assoc. 8-1-91

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APPENDIX Q

APPENDIX 0

TABLE OF CONTENTS

PLANNING

Historical Development

Notebooks	1940
Local Functions Formal Organization Preprinted Forms	1950
Centralized Coordination	1960
Computers Systems Competition	1965
Conflicting Plans	1970
Centralized Data System	1971
A-B-C Philosophy Utilization of EDP-Technology Calculation of Consequences Area Harmonized	1980
IT-Strategy New EDP-Technology Continuity of Systems	1991

Odense-Linde

O-1

TRAINING TO TOTAL EXPENDITURES

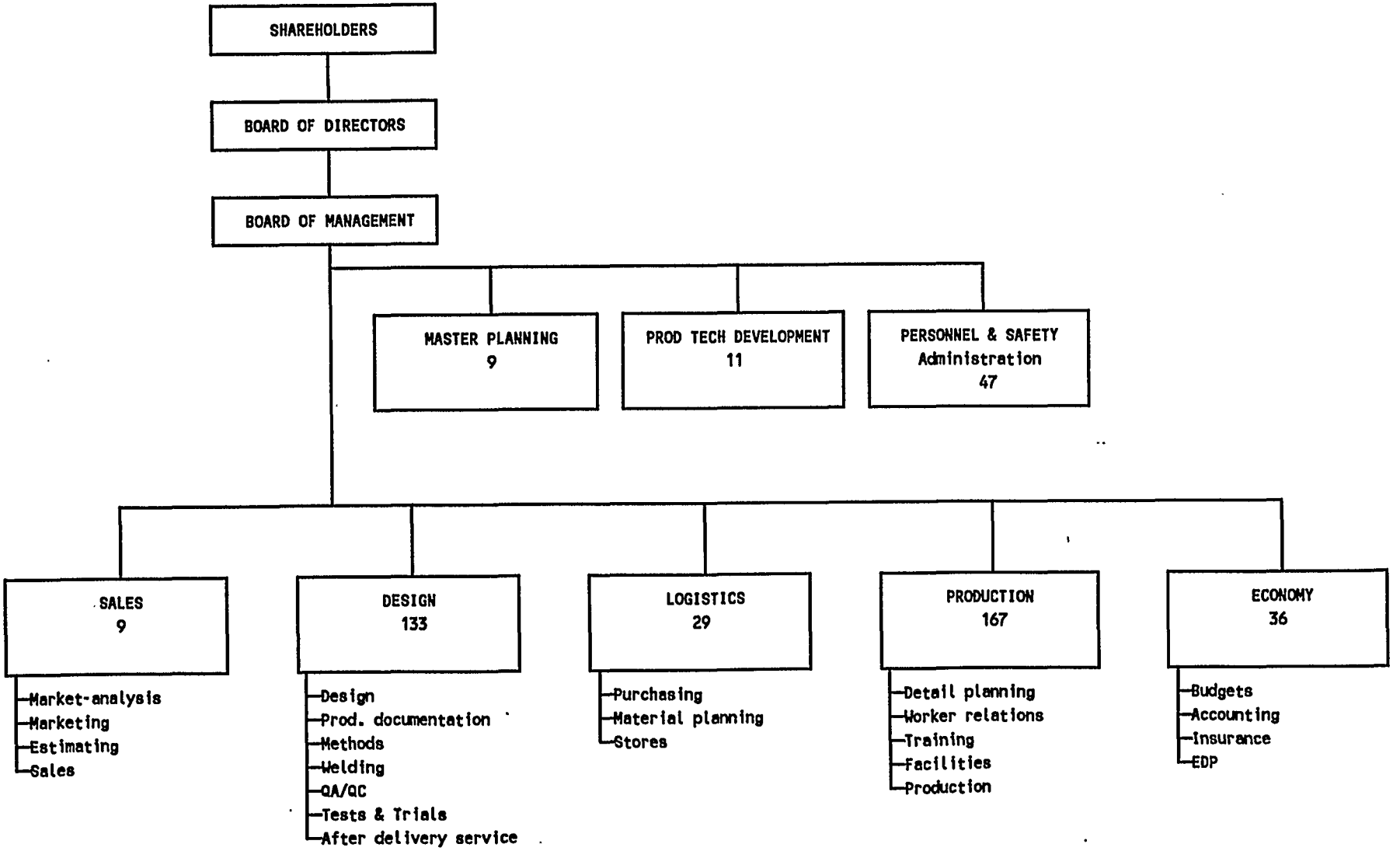
UDDANNELSE 1985-1992								Tal angivet i 1.000
	1985	1986	1987	1988	1989	1990	1991	1992
KVALITETSPROJEKTER						3.000	2.800	
CAD/CAM UDD.:	330	990	660	743	2.063	10.115	13.100	
FAGLIGE KURSER	2,505	1.921	2.441	3.132	4.035	5.406	5.700	7.2
SIKKERHEDSKURSER	44	6	10	32	17	22	25	
UDDANNELSESVAERKT (UPOS/JUUST)					150	600	150	
TOTAL	2.879	2,917	3.111	3.907	6.265	19.143	21.775	

HB/EVH./9lO8l3

0-2

BURMEISTER & WAIN SHIPYARD

Organization Chart



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